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ABSTRACT

Designed to provide information for decision-making by Ivorian authorities in the planning of post-primary education over the coming decade, this study compares the implications of alternative policies or scenarios in terms of social impact, technological alternatives, enrollment, and costs. Two parallel channels are assumed open to students under all scenarios--secondary education, with its present structure of a selective first cycle of general studies leading either to the labor market or to further education; and complementary education, a new channel which incorporates general education and work orientation components, with a high degree of flexibility in response to the preparation and needs of individual students. Each scenario is described by the choice of a particular option in each of the seven relevant areas of decision identified; these areas fall into three categories--specification of alternative channels of post-primary education, options affecting student flow, and options affecting the efficiency (and cost) of providing post-primary education. Appendices provide additional data displays and an outline of selected technological alternatives. (BBM)

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# Post-Primary Options in the Ivory Coast

by

Andre Daniere
Francois Orivel

July, 1977

BEST COPY AVAILABLE

Consultants: Stuart Wells
Emile McAnany

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# SUMMARY

## I. General Objective

The objective of the study is to assist Ivorian authorities in the planning of post-primary education over the coming decade. A rapid growth in the demand for such education is expected as a result of the large projected increase in the number of pupils reaching the CM2, and that demand must be met -- at least until age 15 -- under the terms of the recently promulgated Educational Reform.

## II. Method and Coverage of the Study

The report compares the implications of alternative "policies" or "scenarios." A scenario is described by the choice of a particular option in each relevant area of decision. Seven such areas are identified, falling into three major classes:

### A. Specification of alternative channels of post-primary education

Under all scenarios, two parallel channels are assumed open to students completing the CM2:

- Secondary Education, with its present structure, i.e., a selective first cycle of general studies leading either to the labor market (preferably via formal training programs) or to further education, and a diversified second cycle.
- Complementary Education, a new channel opened to all who complete the primary cycle. Complementary education must incoporate general education and work orientation components, with a high degree of flexibility in response

to the various ages, educational attainments and interests of admitted pupils. This can be achieved best through a non-graded cycle offering a variety of short and long courses, and which pupils would normally attend through their 15th year. The complementary cycle would also accept pupils who failed to gain admission to sixième at the end of their first CM2 year and wish to renew their candidacy.

B. Options affecting the student flow through post-primary education

These options affect as well the CM2 enrollment through their impact on repetitions. They concern four areas of decision:

1) Rate of access to sixième. This rate is the percentage eventually gaining access to sixième among pupils completing the primary cycle. Three alternative options are considered under this heading: 30% (lean policy), 44% (current rate), and 50% (liberal policy).

2) Control of repetitions in the preparation to the sixième entrance examination. Both options retained in this respect impose a limit of two years on repetitions. The first option, characterized as a loose policy, allows repetitions to continue at their current cumulative rate; the second option, described as a tight policy, reduces repetitions substantially. The selected rate of access and the selected mode of control of repetitions determine the proper rate of admission to sixième, i.e., the annual percentage of candidates to admit through examination or other means.

3) Control of pupil flow through the first cycle of secondary education. The pattern of promotions, repetitions and abandonments in the first cycle is fixed under the 30% rate of access. Under the 44% and 50% rates, however, two alternative patterns are considered: the first generates a student flow similar to the current one, while the second produces a more "efficient" flow, i.e., reduces student wastage.

Given independent annual projections of (i) the number of students who reach the CM2, (ii) the growth of capacity in the complementary cycle, and (iii) the enrollment in private secondary education (first cycle), the combination of options selected under each of the three listed areas of policy determines annual public enrollment in both channels of post-primary education. While identified options permit a total of 10 combinations (or scenarios), only six of these are selected for further analysis and evaluation.

C. Options affecting the efficiency (and cost) of providing post-primary education

Such options are specified only with respect to secondary education (first cycle). Two areas of decision are considered:

1) Instructional settings and their enrollment share. Secondary education can be procured in different settings, three of which are identified in the study: institutional education, community education, and extension education. The community education model is designed to serve small groups of students in the less urbanized areas; it relies on televised lectures and on the assistance of monitors with

normal-school training. Extension education addresses individuals who lack access to structured classes, and relies on a mix of radio and correspondence instruction. The three options considered under this heading consist of three alternative percentage distributions of the first-cycle student body among the three institutional settings.

2) Technology of institutional secondary education. Three "technological" options are considered with respect to institutional education within the first cycle: Traditional instruction, Traditional instruction with complement of media, and Reformed instruction centered on the utilization of media.

Individual options with respect to instructional setting and technology lend themselves to a total of 9 combinations. These can be linked with the six combinations selected under Section B. to provide a total of 9 x 6 = 54 complete scenarios. However, the cost projections performed in the study are limited to a "sample" of only 12 such scenarios.

## III. Analysis and Conclusions

### A. Enrollments in the first cycle of secondary education

Under the most restrictive set of options, public enrollment in the first cycle of secondary education reaches 185,000 by 1990, or 3 times the current level. Under the more liberal options, the multiplication factor is 5. If the private sector is included, a liberal policy gives a 1990 enrollment of nearly 400,000, representing 7% of the total population (the percentage in France is only 5%).

The resource mobilization required to meet these objectives will certainly strain Ivorian capacities, irrespective of its financial implications. The analysis of manpower utilization in the Ivory Coast also suggests that a large percentage of individuals trained at the secondary level will have to enter occupations currently accessible to less educated people, and in which general secondary education has a low or negative rentability.

From the standpoint of both efficiency and equity, and independently of the listed options, it is recommended that (i) "parallel" entries into the first cycle be reduced or rationalized, (ii) equivalent rules be imposed on pupils of the traditional and TV primary systems for admission to sixième, and (iii) substantial repetitions be allowed in preparing for the sixième entrance examination.

B. Enrollments in the complementary cycle

Total enrollments in the complementary cycle are projected to reach between 300,000 and 350,000 by 1990 under all options. Excluding all students working toward the sixième entrance examination (students who would repeat their preparation in the CM2 under current practice), the projected 1990 enrollment is 270,00 under options that restrict access to secondary education, and 150,000 when secondary education is more generally available.

C. Projected costs

The projections concern annual expenditures rather than measures of economic cost, since the latter vary in accordance with the decision problem under consideration. The component contributed by complementary education is calculated net of expenses generated by repeaters of the preparation to the sixième entrance examination, since the latter are simply transferred from the CM2 to the new cycle. Expenditures reported for secondary education concern only the first one.

Cost variations associated with shifts in the setting and technology of secondary education are substantial. Options affecting the size of enrollments have a lesser impact, as a drop in enrollments of the secondary cycle to be compensated by a rise in the complementary cycle. The cost is nevertheless reduced under options that restrict access to the secondary cycle, since the annual cost per student there averages about twice the cost in the complementary cycle. The most costly policy (combining "expensive" secondary education with liberal access) generates an annual expense of 74 billion F CFA in 1990. Under the most economical policy, this figure drops to 49 billions; however, an annual minimum of 56 billions (option 10) must be spent by 1990 to achieve a reasonable level of access to secondary education.

Given that the Ivory Coast already has one of the world's highest expenditure on education, whether compared to its public budget (40%) or to its GNP (7-8%), financial soundness appears to require that the choice of policy be limited to the less expensive options.

# INTRODUCTION

## OBJECTIVES AND PLAN OF THE STUDY

## I. Definition of Issues

The situation faced by Ivorian post-primary education at this time (1977) is characteristic of what occurs in most developing countries following their rapid passage from a pattern of widespread abandonment to one of quasi-universal completion of the primary cycle. The pressure of social demand merges with imperatives of social equity to induce the maintenance or expansion of previous rates of access to post-primary education, so that massive increases in admission to post-primary programs must be accommodated. The shift from elite to mass education at the post-primary level requires in turn that the learning objectives and infrastructure of the system be modified, either through reform of what used to constitute "secondary education," or through the parallel development of alternative post-primary programs. In addition to the medium-term problems raised by this adjustment, more immediate ones result in the Ivory Coast from the coexistence of two primary-education tracks (traditional and TV) during the transition period.

## II. Current and Projected Growth of Secondary Education

The challenge faced by the secondary school system in the Ivory Coast can be illustrated quite simply as follows: Assuming a stabilization of the rate of access to sixième (first secondary grade) near its current level, and given available projections of the number of pupils to reach the CM2 (final primary grade) in future years, the number newly admitted to sixième will grow from 30,000 in the past year (1976-77) to nearly 70,000 in 1986 and 95,000 in 1990. The present level of admissions to sixième is itself up from 20,000 in 1971.

The growth in numbers reaching the CM2 is traceable to two circumstances. The first is a substantial growth in the population reaching the first grade of primary school (CP1) in recent and future years. As shown in Appendix Table A1, that number was relatively stable in the years 1962 to 1968, but has increased since 1968 at an average annual rate of 7.3% and will continue to grow at an average 7.5% through 1985. The second factor is a rapid increase since 1962 of the proportion of first-time enrollees in CP1 eventually reaching the CM2. This proportion was only 48% for pupils entering school in 1962, but it grew by 5 1/2 points every year up to 1969, with the result that a full 87% of pupils entering the CP1 in 1970 could count on reaching the CM2. Given present promotion rates in both the traditional and the TV primary systems, 95% of pupils entering primary schools now and in the future will complete the full primary cycle.

The access rate from the CM2 to the sixième has declined in recent years, with the result that the growth in number reaching the CM2 has not been translated into a comparable growth of entries into sixième. Of those who enrolled in the CM2 for the first time in 1970, nearly 50% eventually found their way into sixième. That proportion, however, had fallen to less than 46% for pupils reaching the CM2 in 1974.* Correspondingly, while new enrollments in the CM2 rose by a full 49% from 1970 to 1974, admissions to sixième went up by only 30% between 1971 and 1975.

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*An additional 3% or more entered unaccredited secondary schools, or other schools outside the Ivory Coast, and are not included in official statistics. Many, however, are incorporated in the statitics of latter grades as the result of their transferring to accreditted Ivorian schools or of their school becoming accredited.

## III. Problem Identification

The problems created by the growth of admissions to sixième under current (or increased) rates of access can be outlined as follows:

(1) If the secondary system remains unchanged, the cost of supporting secondary-school enrollments will increase in proportion to the level of new admissions. Given the present flow of students through the secondary-school system, each new entry in sixième results in an average 3.7 years of enrollment within the first cycle alone (cycle of four years, running from sixième to troisieme), and the cost per student-year in the public system is now averaging 180,000 CFA (1975 prices). For a full estimate of the social cost, the foregone productivity of students should also be counted. Given the unreliability of earnings as an indicator of marginal productivity, however, the magnitude of this cost is difficult to estimate.

(2) It is not at all clear that the projected costs can be justified in terms of related social benefits. In the present state of manpower planning in the Ivory Coast, any decision to maintain or increase rates of access to the secondary level of education will represent a response to social (popular) demand rather than a calculated move to meet the needs of Ivorian economic development. While the value of a more educated labor force is recognized by Ivorian economic and social planners, indications are, at present, that only a minority of those projected to enter secondary schools can expect to be absorbed at the end of their studies in occupations currently reserved for graduates of

secondary or higher education. This suggests that much of the secondary education to be provided will add little to the national product and may generate a net economic loss. Furthermore, given the rapidity with which the stock of new secondary school products will grow in the coming decade, the natural process by which expectations are lowered (in the light of observed employment offers to recent graduates) will have no time to unfold, so that each new crop of graduates is likely to experience grave employment frustrations.

(3) Even if the expenditure is justified in terms of its impact on the achievement of national objectives other than economic productivity, it may place intolerable strains on public finances in the Ivory Coast, i.e., on the government's capacity to transfer resources from the private to the public sector. Furthermore, the Ivory Coast may not have on hand all the specialized resources required to meet the demands of a rapidly expanding secondary education, so that time-consuming investments would have to precede any future growth in enrollments. This is especially true of teaching personnel, already constituted in its majority of foreign (mostly French) cooperants.

(4) Current plans of the Ivorian government call for an extension of post-primary education to all children up to age 15, whether in a common cycle that would displace early grades of the current secondary system, or in two parallel cycles, the new "complementary" classes attending to students who do not pursue a secondary education. This would add further to the cost of education in the Ivory Coast, although not in proportion to additional enrollments if, as expected, the per-student cost in new classes

is less than in secondary schools.

It can be argued that a substantial fraction of the new layer of children educated beyond primary school would increase their productivity in excess of education costs, if proper efforts are made to adjust curricula to prospective careers. At any rate, the pupils who would otherwise vegetate in the first secondary cycle might benefit more from the alternative education, and do so at a lesser cost. Very few would shift to the alternative, however, if secondary education remains available to them. What is more likely is a popular insistence that all post-primary institutions become centers of preparation for further secondary schooling.

## IV. Determinants of Social Demand

For historical reasons, and given the current pattern of access to careers in the Ivory Coast, the demand of pupils emerging from the primary cycle is not for post-primary education in general, but more specifically for the type of secondary education now offered by the lycees and CEG's. This does not mean, of course, that the offer of a valid post-secondary alternative could not attract a substantial percentage of pupils away from traditional channels.

The desire for secondary education is understandable in view of the high private rate of economic return it promises. A rough estimate of these rates can be made from the data reported in Table 1 concerning salary levels at different levels of educational attainment in the labor force. Ignoring direct expenditures incurred by individuals in pursuit of their studies, and counting

## TABLE 1

### Monthly Salary Level by Education Level
### (In 1,000 1974 CFA Francs)*

| | Level of Education (or certificate) | Salary Level | No. Positions Surveyed |
|---|---|---|---|
| INCREASING EDUCATION ↓ | Illiterate | 11 | 22,841 |
| | Some Primary | 25 | 2,114 |
| | Primary Cycle Completed | 27 | 5,995 |
| | Less than 4 years Secondary | 29 | 1,336 |
| | Competed 4-year First Cycle of Secondary (BEPC, CAP) | 55 | 2,405 |
| | Some Second Cycle of Secondary (BEP, BEI, BEC) | 99 | 614 |
| | Three Cycles (6 years) Secondary Completed (BAC, BS, BTEC) | 128 | 339 |
| | (IUT, BTS) | 158 | 123 |
| | Grand Schools | 230 | 605 |
| | Not Declared | 32 | 5,597 |

*The exchange rate is approximately 250 CFA Francs = $1 U.S. The CFA Franc is fixed at 50 CFA Francs = 1 F. Fr.

Source: Enquêtes de la Main d' Oeuvre

"foregone earnings" as the only investment made by students, the rates are as follows for each increment of schooling:*

| | |
|---|---|
| Illiterate | -- |
| Primary - incomplete | 23% |
| Primary - complete | -1% |
| Secondary, first cycle - incomeplete | -1% |
| Secondary, first cycle - complete | 38% |
| Secondary, second cycle - complete | 52% |
| University/ | 10% |

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*Example: In calculating the private rate of return to incomplete primary education, the costs are 11,000 CFA per month for four years up to discount year j, while the benefits are 25,000 - 11,000 = 14,000 CFA per month for the next 40 years (assumed working life). The rate is obtained by using the formula:

$$\sum_{k=1}^{j} \frac{C_k}{(1+\sigma)^k} = \sum_{\ell=j}^{m} \frac{B_\ell}{(1+r)^\ell}$$

where $C_k$ is the income foregone in year k

$B_\ell$ is the income benefit in year $\ell$, and

$r$ is the private rate of return

This is a rough calculation valid only to estimate general magnitudes, since (i) the income differential observed in one year will not remain constant over the working life of individuals, (ii) the alternative earnings of young students must be less than the earnings of working individuals with a similar education, and (iii) alternative earnings are also sensitive to the level of underemployment.

These economic returns are enough to explain the high pressure of demand for education up to the end of the first cycle of secondary education and, if possible, to the baccalaureat level. They also provide a good rationale for the tendency of pupils with no prospects for a secondary education to abandon school before they reach the CM2 ( low return on completing the primary cycle). From the standpoint of contemplated programs of alternative post primary education up to age 15, the low (negative) rate of return currently effective for incomplete education through the first secondary cycle signals that pupils completing primary school may initially be reluctant to enroll in any kind of "complementary cycle" of only two or three year duration.*

For well known reasons, the salary differentials reported in Table 1 should not be taken as indicators of the marginal economic productivity of corresponding educational increments.** To the extent that higher paid individuals do have greater productivity, their better general education may be a simple correlate of higher native ability and more favored socio-economic background rather than an independent factor of productivity. Furthermore, in all sectors where salaried employment dominates, the hierarchy of occupations and remunerations is determined as much by considerations of organizational efficiency, with reinforcement from administrative regulation, as by classical mechanisms of factor substitution under competitive market conditions. While the acquisition of more general education allows individuals to reach higher levels of the hierarchy, their salary gain is partly at the expense of others and is not reflective of their marginal contribution to the national product.

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*Such reluctance will be overcome fairly rapidly, even if the curriculum of the new cycle fails to match developing economic opportunities. The jobs that recently "required" a partial or complete primary education will be "upgraded" as a result of (i) the generalization of primary school completion and (ii) the existence of a new higher diploma or certificate, and the private rate of return earned a few years ago from a partial primary education will be shifted, first, to full primary education, and later to completion of the next cycle.

**The rates subsequently calculated should not, in any case, be interpreted as marginal rates of social return, since the cost of producing education is not included in the computation.

## V. Scope of the AED/AID Study

If Ivorian authorities are to develop a national strategy of response to social demand, they will ideally require two related classes of information -- or answers to two classes of questions:

(1) For each level of response to demand, which specific combination of programs will make the maximum contribution to national objectives?* The question cannot be answered in full by

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*The decisions of Ivorian authorities are assumed to respond to (and achieve a compromise between) two types of stimuli: (a) group pressures toward specific interventions, such as the insistence of pupils and their families on access to secondary education; and (b) a fundamental commitment to the maximization of some weighted index of national objectives, previously negotiated through the political process and incorporated in national planning. Two national objectives of prime importance in Ivorian planning are increases in net economic product (economic efficiency) and progress toward greater social equity. The terms "social benefit" and "social cost" in this document refer to changes in the index by which Ivorian authorities are presumed to measure the country's performance in terms of scheduled national objectives.

this Report without preempting political options of the Ivory Coast concerning the relative weights to be placed on various national objectives. Furthermore, the quality of the information available to carry out the analysis is not such as to justify firm predictions of the impact of education policy on relevant economic and social outcomes. It is possible, however, to (a) compare alternative student flows through post-primary systems from the standpoint of their economic productivity, (b) evaluate associated effects on employment and social mobility, and (c) seek cost-effective methods of providing instruction.

(2) Assuming that, as the level of response to popular demand increases, the net social benefits of post-primary education first increase, eventually reach a maximum, and then decrease, at what point should the response be stabilized? The limitations identified with respect to question (1) affect the possible scope of answers to this question as well. The selection of an optimum balance between greater satisfaction of popular demand and increased fulfillment of national objectives is a political decision which must be left to Ivorian authorities. At best, the analysis can suggest limits beyond which the sacrifice of economic and other social benefits implied by further concessions to the competitive clamor for education would generally be considered excessive.

The objective of the study undertaken by the AED/AID team is to provide Ivorian authorities with some initial components of this information:

(1) For alternative scopes and contents of the post-primary education provided in response to social demand, Part One

attempts to evaluate impacts in terms of economic productivity, employment and social equalization of opportunities for education. The analysis of productivity remains highly speculative given the limited resources dedicated to it by the evaluation team and the lack of validated economic models in this area. While reference is made to the economic cost of alternative enrollments, comprehensive cost computations are not carried out until Part Two.

(2) Part Two of the document considers alternative options in the technology of post-primary education, with the objective of providing that education at minimum cost under any specification of its scope and content. Initial estimates of the annual expenditure over time are provided for alternative combinations of technologies in association with different policies respecting the growth of enrollments and their distribution between major types of education. While the budgetary implications of these alternatives are evaluated by reference to projected economic and fiscal capacities of the Ivory Coast, a rational determination of their strategy by Ivorian authorities requires that the expenditures computed in Part Two be related to the social outcomes identified in Part One.

# PART ONE

## ALTERNATIVE SCOPES AND CONTENTS OF POST-PRIMARY EDUCATION: PROJECTED SOCIAL OUTCOMES

## I. LEVELS OF RESPONSE TO SOCIAL DEMAND AND PLAN OF ANALYSIS

(1) To simplify exposition, levels of response to social demand are initially specified in terms of rates of access to the first grade of secondary education (sixième), i.e., of the percentage of pupils reaching the last primary grade (CM2) who gain admission to the secondary system. Chapter II, following, deals with the social implications of these alternatives. The extent to which social demand is satisfied, however, depends not just on levels of admission to sixième but on the entire flow of students through the system. The impact of alternative flow patterns on (i) popular perceptions of the accessibility of secondary education and (ii) social outcomes of interest must accordingly be evaluated.

(2) It is assumed that the guarantee of free education to all until age 15, promised under the Ivorian Education Reform, will be progressively implemented between 1977 and 1985. This means that an increasing proportion of people under 15 who have completed the primary cycle and are not enrolled in secondary schools will be absorbed under all projected alternatives by a "complementary cycle" which offers a maximum of three years of instruction. This basic schema is analyzed in some detail in Chapter III.

(3) The satisfaction of social demand is also sensitive to the conditions under which students are admitted to either of the post-primary cycles -- especially, the number of chances offered each individual. The limits placed on repeated preparations of

the sixième entrance examination cannot, however, be decided independently of the objectives and policies of the secondary education system. Given the access rate intended by that system (percentage of new CM2 students to be eventually admitted in sixième), the cumulative repetition rate must be selected by reference to the admission rate allowed by secondary institutions (percentage of candidates admitted at the end of the school year), unless the admission rate is itself adjusted to the repetition policy effective at the CM2 level.

The implications of alternative combinations of rates of admission to sixième and repetition patterns in CM2 are accordingly examined in Chapter IV, while the special problems raised in the transition period by the parallel existence of two primary systems (traditional and TV) with different flow structures are discussed in Chapter V.

## II. SECONDARY EDUCATION: SOCIAL IMPACT OF ALTERNATIVE STUDENT FLOWS

### A. Framework of the Analysis

At present, 62% of students entering secondary education reach the last class of the first cycle (troisième),* 22% are admitted to the second cycle (seconde), 14% reach the terminal grade, and 12% obtain the "baccalaureat" degree. Even though another 18% become absorbed in related training programs, it is evident that the attrition process is severe, and that it affects both the composition of secondary-school outputs and the total level of enrollment. Specifically, each student admitted to sixième spends an average of only 4.3 years in secondary school, and as many as 63% of admitted students are quickly delivered to active life with no other qualification than a few additional years of general education.

Assuming that the teaching dispensed in the first cycle of secondary education by the lycées and CEG's will continue to deal with general education, the various educational careers of secondary-school students can be regrouped into a number of "modules," based on (i) the number of grades completed in the first cycle, and (ii) the type of formal education or training structure, if any, entered upon leaving the cycle. The distribution of admitted students by module can be read from standard charts describing the student flow through the first cycle and into receiving structures. (See Diagram 1, p. 61.)

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*Based on transition and repetition rates of school year 1973-74, collected by the Service Autonome in: Le Rendement Interne de L'Enseignement du Second Degré de 1973/74 a 1974/75.

From the standpoint of module identification, the student flow data presented at the beginning of this section can be reinterpreted as follows: At present, 48 out of 100 students *who enter the cycle* leave it before they reach the fourth grade (troisième), and only 5 of these are reported as securing formal occupational training. Of the 52 who complete the cycle, 22 continue their education through the upper cycle of the secondary level, and 10 are known to receive training in accredited occupational programs.* In terms of students reaching the CM2 (rather than number admitted to sixième), 20 out of 100 get a partial first-cycle education, with 2 going to complementary training; and 25 complete the first cycle, of which 9 continue into the second cycle and 4 are accepted in complementary training.

Given the average productivity gain and education cost associated with each education module, the first question to ask is whether the percentage of admitted students "assigned" by the system to different modules is such as to maximize net economic productivity (or economic efficiency). The system's net productivity is the excess of aggregate gains in the future productivity

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*Computed from data reported by the Service Autonome, *op. cit.* A simplified version of the current student flow is presented in Diagram 1. For students leaving the first cycle in 1974, the actual distribution by *structure d' accueil* was as follows:

| Left before entering troisième | | Completed troisième | | |
|---|---|---|---|---|
| With further training | Without further training | With passage to 2nd cycle | With other training | Without furth training |
| 1,080 | 7,047 | 4,017 | 1,891 | 5,578 |

of students* over the total cost of resources imputed to their education. At first sight, the way to maximize economic efficiency is to increase the percentage of admitted students in "profitable" modules (where the value of productivity gains exceeds education costs) and to reduce the percentage ending up in "deficit" modules (where productivity gains fall short of education costs). This receipe, however, needs to be corrected on two accounts:

(1) Given the percentage of CM2 cohorts progressing through profitable module X, a rise in the level of admissions to the cycle may so increase the output of students trained through the module that the net benefit generated by new recruits falls to zero or becomes negative. Put another way, there is a limit to the number of profitable educations which a system can produce within each module. The efficiency properties of a student flow should, therefore, be evaluated in relation to (i) the projected profile of admissions to the cycle and (ii) the absorption capacity of the economy for different educational outputs.

(2) Since some individuals are better able than others to enhance their productivity through the education of module X, the system's efficiency can be improved through better student selection. If the selection of individuals for profitable modules is improved by the parallel education of others along deficit paths, the incorporation of the latter may contribute positively to economic efficiency.

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*The future productivity gain is calculated as a discounted sum of annual values, and is net of additional training expenses.

Whatever the economic advantages of a particular student flow through secondary education, its social desirability must be qualified by the consideration of other social benefits and costs. One important benefit of increasing admissions beyond the economically efficient level is the fulfillment of social-equity objectives. An associated cost, if students "in excess" are not eliminated early in the cycle, is the eventual frustration of individuals presumably qualified for certain occupations by long years of secondary schooling but unable to find related employment. Finally, some value must be placed on general secondary education as a factor of cultural enrichment and more effective social participation.

The latter consideration becomes crucial in determining the social benefit of providing education to individuals who will play their major social role outside the market economy. In the Ivory Coast, as elsewhere, the most prominent group in this class is that of "non-working" married women, active primarily as home managers and facilitators of their spouse's career. Women have made up almost 30% admissions to sixième in recent years, up from 18% in 1965, and the percentage of admitted females reaching the second cycle or absorbed in complementary training is only slightly less than the male percentage. The representation of women in secondary education is likely to reach 40% or more by 1985, in line with the rising percentage of girls in CM2 classes.* If, as is probable, opportunities for employment -- and the disposition of educated women to seek such employment -- do not rise accordingly, a high proportion of women educated through the first cycle will enter active life as wives and mothers rather than as direct contributors to economic productivity.

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*The percentage of females in CM2 classes rose from 22% in 1965-66 to 30% in 1973-74, and it will approach 45% over the coming decade.

The secondary education of women destined for family roles cannot be treated as socially wasteful. There is a strong likelihood that the economic performance of working males is enhanced by their wives' education, and it is evident that the creation of more equal opportunities for women must begin with education. Perhaps even more important, however, is the contribution that more educated women can make to the evolution of perceptions, attitudes and cultural expressions in Ivorian society, both directly and through their influence on the development of younger generations.

## B. Economic Efficiency -- First Approximation

### 1. Principles of Evaluation

Leaving aside all problems relating to student selection, the specification of an economically efficient student flow through secondary education can be determined by reference to the projected capacity of each "profitable" education module. As a first approximation, a module is classified as profitable as long as the numbers of individuals it annually delivers to the labor force does not exceed the number of job openings for which the training provided under the module constitutes a qualification.*

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*This assumes that (i) the module is cost efficient in fulfilling its training objectives, (ii) the cost of that training is inferior to the gain in productivity it achieves for individuals employed in occupations that "require" that much training or more, and (iii) the cost exceeds the productivity gain for individuals employed in occupations which do not "require" that much training.

By this standard, the great majority of students issued from secondary education until recently have been absorbed in profitable modules. Table 2 indicates that in 1971, for the private sector, most individuals with some secondary education were employed in occupational classes where such education was "required" under standards effective in the Ivory Coast. Specifically, the percentage found in the "ouvier spécialisé" and "manoeuvre" categories are low for all individuals with some first-cycle education (27% for those with less than 4 years, 6% for completers of the cycle), and the percentage of "non-qualifiés" among those with a second-cycle education is only 2%.

The validity of the efficiency assumptions (previous footnote) made with respect to current and developing standards of qualification in the Ivory Coast, however, is not beyond question. Ivorian planners are contemplating a requirement of two years of secondary education for "ouvriers qualifiés," four years for "employés qualifiés," and up to six years for higher categories of personnel, with a complement of specialized training in all cases. Yet, it is evident from Table 2 that the private sector of the Ivorian economy has managed to survive until recently with a labor force far less educated than "required" in accordance with the standards. For example, one worker out of two in the "employé qualifié" category, and one out of four in the "maîtrise" category, had not completed their primary education in 1971. Among the "ouviers qualifiés," only a minority had gone beyond the primary level, and one quarter or more were illiterate. Would the education of all this personnel through some grades of the first secondary cycle have generated a net economic gain?

## TABLE 2

### Private Sector: Actual Employment Classifications with Actual Education Levels, 1971

| Actual Education Levels (certif.) | Actual Employment Classification[1] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (D) | (C-T) | (M) | (EQ) | (OQ) | (ENQ) | (OS) | (MO) | OTHERS |
| Illiterate | 130[2] | 13 | 88 | 139 | 3,247 | 2,811 | 10,962 | 36,373 | |
| Some Primary | 120 | 28 | 244 | 821 | 1,454 | 1,518 | 2,185 | 1,330 | |
| Completed Primary (CEPE) | 190 | 103 | 628 | 2,311 | 1,195 | 2,575 | 2,060 | 1,119 | |
| Less than 4 yrs of Secondary | 75 | 127 | 245 | 740 | 312 | 559 | 525 | 286 | |
| Completed First Cycle (4 yrs) Secondary (CAP, BEPC) | 260 | 493 | 1,104 | 1,587 | 540 | 556 | 163 | 40 | |
| Some Second Cycle of Secondary (BEC, BEI, BEP) | 177 | 289 | 363 | 325 | 75 | 21 | 7 | 5 | |
| Completed Secondary (BAC, BSEC) | 357 | 369 | 346 | 175 | | 12 | | | |
| IUT | 20 | 64 | 42 | 2 | | | | | |
| Grand Ecoles | 588 | 921 | 104 | 32 | | | | | |
| Non-Declared | 657 | 1,370 | 2,523 | 3,301 | 7,810 | 4,051 | 12,178 | 15,837 | 993 |
| TOTAL | 2,574 | 3,777 | 5,687 | 9,433 | 14,633 | 12,103 | 28,070 | 54,990 | 993 |

Source: Enquêtes de la Main d'oeuvre

[1] Employment Classification Abbreviations: (D), Direction; (C-T), Cadre Techniciens; (M), Maitrise; (OQ), Ouvriers Qualifiés; (EQ), Employés Qualifiés; (ENQ), Employés Non Qualifiés; (OS), Ouvriers Spécialisés; (MO), Manoeuvres.

[2] Total number of persons for each employment classification and education level.

There is, unfortunately, no firm evidence on which to base an answer. The reference to general-education required (or observed as an average) in more advanced countries is misleading, since the education expected in each occupation depends primarily on the overall level of education of the population, and policies affecting the latter have had very little to do, historically, with informed evaluations of the impact of education on productivity. Nevertheless, it is probably safe to assume that a positive net economic gain accrues from (i) primary education (6 years) in all occupations above that of "manoeuvre," (ii) some first-cycle education for all but "manoeuvres," "ouvriers spécialisés," and the lower scale of "employés non-qualifiés," and (iii) a complete secondary education for "cadres/techniciens" and a high percentage of occupations in the "direction" and "maîtrise" categories.*

There is much less ground to question the economic rentability of the specialized training required as a complement to general education under the proposed standards. Such a training must currently be provided by employers (both private and public) when not acquired in independent programs. This alternative suggests that occupational training might, indeed, be left to employers rather than be expanded as a formal activity of the education system. Training by employers is much more likely to be realized at minimum cost and to meet the test of economic rentability since, in the private sector at least, these conditions coincide with those of maximum profitability.

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*The low potential of secondary education for the least "qualified" categories can be illustrated as follows. Three years of first cycle education would cost a minimum of 600,000 francs CFA (1975 prices) under existing technologies, excluding all foregone social product. Given an average salary of 200,000 francs (1975) in these categories, and discounting at 10%, a worker's general secondary education would have to increase his productivity by some 30% to justify the expenditure. If the foregone social product is added in -- and conservatively valued at two years of salary --, the necessary productivity increase would be 50%. Such a favorable outcome of general education at this level appears most unlikely.

Employer training does have its drawbacks, however, especially with respect to transferability. Furthermore, as long as qualified non-Ivorians retain a large degree of competitive access to jobs, they will be hired in preference to Ivorians if the latter enter the labor market without a full complement of training. While a dominance of non-Ivorians in the labor force occurs only at both extremes of the occupational classification ("direction" and "cadre-techniciens" on the one hand; "manoeuvres" on the other), about one-third of all qualified workers in the private sector originated from outside the Ivory Coast in 1971 (see Table 3). For the sake of Ivorian incomes and Ivorian control, therefore, an increased reliance on accredited training institutions appears desirable.

## 2. Limits of Economic Productivity

The capacity of beneficial secondary-education modules can be projected in the light of adjusted occupational requirements specified above, based on expected new job openings in each occupational category. Capacities are expressed as a percentage of each cohort completing the primary cycle (number first enrolled in the CM2 class), with an horizon of 12-15 years.

### TABLE 3

### Private Sector: Employment Levels by Sex, Nationality and Employment Classification, 1971

| Employment Classification | Ivorians |  | Africans Non-Ivorian |  | Non-African |  | Not Declared |  |
|---|---|---|---|---|---|---|---|---|
|  | Men | Women | Men | Women | Men | Women | Men | Women |
| Direction | 325 | 35 | 220 | 13 | 1,752 | 217 | 11 | 1 |
| Cadres-Techniciens | 634 | 61 | 251 | 19 | 2,555 | 256 | 20 | 1 |
| Maîtrise | 2,490 | 183 | 707 | 36 | 1,604 | 584 | 60 | 25 |
| Employés Qualifiés (Cat. 5 et +) | 5,569 | 736 | 1,554 | 113 | 151 | 1,305 | 28 | 17 |
| Employés Non-Qualifiés ( < Cat. 5) | 6,628 | 473 | 4,790 | 68 | 16 | 27 | 83 | 18 |
| Ouvriers Qualifiés (Cat. 5 et + ) | 10,259 | 155 | 3,906 | 29 | 93 | 60 | 126 | 5 |
| Ouvriers Spécialisés (Cat. 3 et 4) | 17,208 | 152 | 10,200 | 49 | 7 | 3 | 425 | 26 |
| Manoeuvres (Cat. 1 et 2) | 16,370 | 255 | 37,041 | 26 | 3 |  | 1,292 | 5 |
| Apprentis | 640 | 33 | 153 | 4 | 6 | 2 | 22 | 3 |
| Non Declarés | 4 | 2 | 3 | 3 |  |  | 82 | 36 |
| TOTAL | 60,127 | 2,083 | 58,785 | 360 | 6,167 | 2,454 | 2,149 | 135 |

Source: Enquêtes de la Main d'Oeuvre

(1) With respect to "employés qualifiés" and "ouvriers qualifiés," the annual output of individuals with some first cycle education and occupational training has represented less than half the estimated requirement in recent years. By 1985 (see Table 4), the annual demand for "employés qualifiés" will be over 4,000,* and that for "ouvriers qualifiés" in the neighborhood of 5,500. In terms of cohorts completing the primary cycle in relevant years (see Appendix Table A2), the demand for individuals with a complete first-cycle education and training will thus come to 5%, and that for people with a partial first-cycle education and training to nearly 6%.

Given the current level of formal training for individuals leaving the first cycle, meeting the demand for individuals in these two categories would require a moderate increase in the availability of training programs following completion of the first cycle (from 4 to 5% of each cohort completing the primary cycle), and a sharp increase in training opportunities after 2-3 years of first cycle education (from 2 to 6% of each cohort). Some reorientation of this training is also in order, since the shortage is acute in many technical occupations, while a surplus is observed in commercial and clerical jobs.

(2) On the other hand, the output of individuals with a second-cycle education appears more than adequate to satisfy projected requirements. By 1985, the annual demand for new personnel in the "direction," "cadres-techniciens" and "maîtrise" categories

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*The annual demand is approximated through division of the projected 1981-85 demand by 5.

Table 4: Demand for New Labor, 1973 and 1981-85 by Employment and Industry Classification

| OCCUPATION<br>INDUSTRY | DIRECTION | | CADRES/ TECHNICIANS | | MAITRISE | | EMPLOYES QUALIFIES | | OTHERS | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1973 | 1981-85 | 1973 | 1981-85 | 1973 | 1981-85 | 1973 | 1981-85 | 1973 | 1981-85 |
| TOTAL | NA | 3,602 | 898 | 3,508 | 982 | 8,594 | 3,390 | 20,506 | 6,857 | 78,870 |
| Forestry, Breeding | NA | 357 | | 167 | | 79 | 6 | 169 | | 18,277 |
| Geology, Mines, Quarries | NA | 3 | 201 | 20 | 13 | 28 | 6 | 18 | 55 | 70 |
| Construction | NA | 44 | 66 | 155 | 86 | 1,415 | 378 | 1,554 | 865 | 2,365 |
| Wood, Plastics | NA | 44 | 10 | 53 | 26 | 94 | 224 | 1,239 | 495 | 2,253 |
| Textile | NA | 30 | 13 | 99 | 23 | 105 | 72 | 435 | 777 | 3,788 |
| Leather | NA | 1 | 2 | 11 | 3 | 23 | 13 | 64 | 37 | 405 |
| Transformation of Agricultural Products | NA | 31 | 8 | 86 | 6 | 129 | 21 | 244 | 135 | 2,329 |
| Chemistry | NA | 12 | 10 | 90 | 14 | 254 | 37 | 372 | 89 | 1,507 |
| Metals, Mechanics | NA | 83 | 71 | 261 | 142 | 1,164 | 592 | 3,876 | 993 | 4,221 |
| Electricity | NA | 17 | 53 | 142 | 50 | 426 | 166 | 1,392 | 228 | 1,198 |
| Transportation, Freight | NA | 21 | 39 | 310 | 31 | 292 | 538 | 2,831 | 1,535 | 30,835 |
| Graphic Arts | NA | 6 | 6 | 15 | 11 | 32 | 43 | 118 | 62 | 229 |
| Misc. Technical | NA | 3 | | 47 | | 991 | | 63 | | 47 |
| Commerce | NA | 1,499 | 132 | 542 | 110 | 557 | 395 | 1,831 | 1,174 | 2,884 |
| Tourism, Hotels | NA | 88 | | 159 | | 265 | | 524 | | 906 |
| Domestic | NA | 4 | | 3 | | 16 | | 297 | | 4,114 |

[continued on following page]

[Table 4 - continued]

| OCCUPATION<br>INDUSTRY | DIRECTION |  | CADRES/ TECHNICIANS |  | MAITRISE |  | EMPLOYES QUALIFIES |  | OTHERS |  |
|---|---|---|---|---|---|---|---|---|---|---|
|  | 1973 | 1981-85 | 1973 | 1981-85 | 1973 | 1981-85 | 1973 | 1981-85 | 1973 | 1981-85 |
| Economics | NA | 21 | 42 | 299 | 74 | 251 | 58 | 643 | 12 | 180 |
| Office | NA | 28 | 73 | 506 | 260 | 1,285 | 774 | 4,329 | 332 | 2,584 |
| Judicial | NA | 1,234 | 347 | 393 | 118 | 206 | 58 | 82 | 15 | 12 |
| Teaching, Research | NA | 9 |  | 27 |  | 109 |  | 56 |  | 21 |
| Medical, Social | NA | 50 |  | 44 |  | 67 |  | 195 |  | 139 |
| Literature | NA | 4 | 4 | 33 | 9 | 30 | 10 | 111 | 46 | 165 |
| Miscellaneous | NA | 13 | 2 | 47 |  | 1,061 | 5 | 61 | 7 | 341 |

SOURCES:

1973: Besoins En Main D'Oeuvre Et Ressources Fournies Par Les Etablissements De Formation, Bilan 1973; Office National De Formation Professionnelle, Ministère De L'Enseignement Technique Et De La Formation Professionnelle.

1981-1985 : Les Besoins En Main D'Oeuvre De L'Economie Ivoirienne, 1976/80, 1981/85, Office National De Formation Professionnelle, Ministère De L'Enseignement Technique Et De La Formation Professionnelle and Direction Des Etudes De Dévelopment, Ministère Du Plan.

will add up to 3,200, or about 4.5% of the relevant cohorts completing their primary education. This is only half the 9% currently admitted to the second cycle.

Since only 6% reach the terminal grade of the cycle and 5% obtain the "baccalauréat," there is no sign of an actual surplus of individuals with a complete secondary education. Given the imbalance of enrollments in favor of commercial careers, a shortage of technical personnel would, indeed, continue to be observed in association with surpluses in other areas, even if the 9% admission to the cycle is maintained. Assuming that the process of student selection and orientation at the upper secondary and university levels will not improve dramatically in the coming years, the satisfaction of national needs in this area may require an intake of up to 10% of each cohort (completers of primary education) by the second cycle.

(3) The 1985 demand for "employés non-qualifiés" is projected in the range of 5 to 6,000. For all to receive an average three years of first-cycle education, an additional 5% of cohorts completing their primary education would have to be admitted to the cycle. Since the economic rentability of secondary education in a large percentage of jobs in this category is open to question, a "general-education" module of variable length is counted as beneficial for up to 4% of each cohort.

(4) The recapitulation of capacities identified for different beneficial modules in the preceding review justifies a total of admissions to the first cycle of secondary education equal to 25% of each cohort completing their primary education (or reaching CM2), with 15% slated to complete the first cycle (10%

continuing into the second cycle and 5% going to occupational training), and 10% released before the end of the first cycle (6% going to occupational training and 4% entering the labor market).

This total constitutes a first approximation of the economically efficient flow of students through the first secondary cycle and beyond, to be corrected in the next section. It must also be taken as preliminary, since it rests on a superficial review of available training and manpower data.* A more detailed and better documented analysis of the problem of transition from secondary education should be undertaken by Ivorian authorities at the earliest opportunity.

## C. Economic Efficiency - Second Approximation and Qualifications

Admissions to the cycle in excess of the number of profitable educations which the system can provide are nevertheless defensible on several grounds, including that of economic efficiency. Specifically, the exclusion of students from further education or training at the end of each grade of the first cycle represents a far better process of selection than equivalent cuts in the rate of access to sixième. Deferred exclusions are based on a cumulative record of performance that is clearly more relevant than student responses to a one-time examination; accordingly, the process of "forcing out" students following liberal admissions is more likely to match individuals and educational modules in accordance with the requirements of maximum net productivity.

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*See notes to Tables 1-4 for sources.

The opening up of admissions at the level of the sixième also represents a positive response to the requirements of social equity, which is only partly offset by exclusions at a later stage. Chances to acquire a productive secondary education are enlarged for the less advantaged students, since development lags experienced at the end of the primary cycle are no longer used to prevent further efforts toward their removal.* Furthermore, several important benefits derive from the admission of women in closer equality with men, even though a sizeable proportion of each female cohort can be expected to remain out of the labor force.

The question, once again, is whether the cost of "excess" initial enrollments is justified by their benefits -- or, more precisely, beyond what point the marginal cost of deficit educations exceeds the marginal benefit they produce. The efficient initial enrollment exceeds in any case the maximum number of profitable educations, since student flows through the system and beyond are not fully controllable, and a "contingency reserve" must be incorporated from the start. How many students should be admitted beyond that level depends on the value placed by Ivorian authorities on different components of the associated benefits and on their responsiveness to the pressures of popular demand.** It would seem, however, that the realistic range of admissions in excess of the number educable in profitable modules falls within 20% and 100%, any percentage under 20 clearly lacking in political feasibility and social equity, and any percentage over 100 leading almost certainly to unacceptable social losses at the margin.

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*On the other hand, the provision of a full secondary education to all students at contemplated levels of admission would generate both high economic costs and dangerous expectation gaps.

**The response to social demand is not fully measured by the number of admissions to the first cycle, since candidates are seeking completion of the cycle or better. However, it is probable that failures to secure secondary level diplomas are more easily accepted by students and their parents once the challenge of secondary studies has been experienced.

## D. Quantititative Options in Secondary Education

The above analysis identifies two extreme sets of parameters between which Ivorian policies respecting secondary education can reasonably be located.

(1) The first is a "lean" policy, based on a number of profitable educations equal to the maximum estimated in section B, and on an "excess" of admissions equal to only one-fifth that number.

The rate of access to sixieme under this alternative is reduced to 30% (one-fifth in excess of 25%). For all profitable modules to be filled to capacity, the student flow must be such that, of 100 students admitted to sixième, 33 (or 10/.3) eventually reach the second cycle, 17 (or 5/.3) go to formal training after completing the first cycle, 20 (or 6/.3) do so before finishing the cycle, and 30 (the remainder) leave the cycle without further education or training.*

Given the narrowing of entries into the first cycle under this alternative, special attention would have to be given to the promotion of more equal access among regions and social groups. Regional disparities are sharp in the present stage of Ivorian development, and their elimination is an important objective of national planning. On a per capita basis, the number of secondary-school students originating from different Departements varies from a low of 4.0 per thousand in Touba to 25.11 per thousand in Gagnoa. As in other social areas, equalization is easier to achieve under conditions of general expansion than otherwise, and its progress would undoubtedly be slowed by a general policy of restricted access. The same applies to the equalization of access by sex: For women to achieve a 40% representation in admissions to sixième (now 25%), and for all occupations to be filled with qualified individuals, women would have to get nearly 30% of all jobs requiring some secondary education (more if some of the men are hired in jobs for which their secondary education is not required).

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*An illustrative student flow consistent with this pattern is shown in Diagram 2, p. 62.

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(2) The second alternative may be termed "liberal" for lack of a better word. It is based in part on more optimistic expectations concerning the productivity of general secondary education and/or its cost of production, with due regard for the possible adoption of more efficient education technologies. It also implies a high valuation of the benefits of more informed student selection and better equalized social opportunities. Finally, it recognizes the political difficulty of narrowing up entry into any established cycle of education.

Under this policy, admission to sixième is raised from the present 45% of cohorts reaching the CM2 to 50%, or twice the capacity of profitable modules. The student flow required to exhaust the capacity of profitable modules can again be determined from percentages estimated in section B: out of 100 students entering sixième, 20 (or 10/.5) reach the second cycle, 10 (or 5/.5) go to formal training at the end of the first cycle, 12 (or 6/.5) do so before completing the cycle, and 58 leave without the benefit of complementary training.

Given the large size of the latter group, its members will compete for jobs currently held by individuals with a CM2 education and, as well, for places in formal training programs now entered at that level. Pressures for access to secondary-level training programs will also tend to raise admission requirements there, so that programs currently accessible after one or two grades of the first cycle will call for three or four, and those already requiring four grades will become more competitive. If the first cycle is to play its role as a selection device, and if all feasible economies are to be achieved consistently with stated objectives, the bulk of student eliminations (exclusions from profitable modules) should be accomplished at the end of the first and second grades, rather than through another set of massive examinations after bringing most students to the fourth grade (troisième).* Students eliminated at the end of the first two grades should then be allowed to transfer to the complementary cycle (see III below), although the expectation is that few would choose to do so.

The choice of policy alternatives close to the "liberal" pole may not be justifiable in the absence of a shift to new educational technologies capable of effecting a substantial reduction of the cost per student year. "Technology," in the present context, refers to the whole modus operandi of schools or training programs, and incorporates as a component the possible utilization of modern audio-visual means (for which the term "technology" is often reserved in educational literature).

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*An illustrative student flow consistent with this pattern is shown in Diagram 3, p. 63.

(3) The policy choice extends to any rate of access between the 30% specified under the lean policy and the 50% effective under the liberal policy. The only alternatives considered in the review carried out in Part Two, however, are 30%, 44% and 50%, the intermediate rate being that recently observed in the system and selected as a potential objective in several documents of the Service Autonome.

Alternative options are also worth considering with respect to the student flow beyond admission. The two extreme policies, as described, incorporate a relatively "efficient" student flow, i.e., the number of students carried through each identified sequence is exactly the number required to satisfy manpower demands, and the weight of student eliminations is shifted toward the early grades of the cycle. The specific "efficient" flows to be considered in Part Two are those illustrated in diagram 2 (for the 30% rate of access) and diagram 3 (for the 50% and, by extension, the 44% rates of access ). Less efficient solutions may have to be accepted, however, in response to parental pressures for a high rate of student retention. Accordingly, two alternative student flows are considered in association with the 50% and 44% rates of access: (a) the relatively efficient flow represented by diagram 3, and (b) the less efficient flow implemented in the current system and represented by diagram 1.

## III. CURRICULUM OPTIONS IN COMPLEMENTARY EDUCATION

If the rate of access to sixième becomes stabilized at 44%, and if no alternative post-primary channel is developed, the number of completers of the primary cycle left without further schooling will grow from an annual 40,000 at present to 85,000 in 1985 and nearly 120,000 in 1990. Any reduction in the rate of access to sixième ("lean" alternative), would result in even higher figures. Such an outcome, however, is excluded under existing commitments of the Ivorian government: The Education Reform mandates the provision of free education to all children up to age 15, and thus beyond the expected age of primary school completion.

The guarantee of some post-primary education to pupils left out of the secondary system represents a minimum response of Ivorian authorities to pressures of the less favored classes for equal access to education. While the expansion of secondary schooling already represents a massive advance toward more equal opportunities, the very size of the secondary enrollment (nearly one-half of those completing the primary cycle) removes post-primary education from the category of "selective" cycles and creates for all who reach the end of primary education and expectation (and a recognizable right) of access to further studies. To refuse this access to over half of the qualifying cohort would generate a high level of frustration.

The generalization of education up to age 15, however, appears to be quite justified by the benefits it promises in terms of national objectives. Not only does the institution of a complementary cycle beyond the primary years help equalizing opportunities among different sectors of the population, but it has the potential of generating a substantial net economic return. The primary system provides no specific preparation for the integration of individuals in production structures, whether in the form of occupational training, general skill development or vocational orientation. Such preparation is likely to be highly productive and cost efficient during the coming phase of Ivorian development, since a majority of the individuals to be absorbed in modern sector (or modernized) occupations can rely on no personal, family or community experience in developing appropriate attitudes and perceptions. Under the nearly automatic promotion now prevalent in all branches of the primary education system, a substantial proportion of pupils completing the CM2 will also be lacking the basic skills sought by primary education. The functionality of this group can be improved at relatively low cost through the provision of a mix of general education at the upper primary level and occupational training or orientation.

The development of post-primary alternatives poses problems similar to those identified in relation to the growth of secondary schooling: financial costs and constraints on resource mobilization. An additional difficulty met in the development of alternatives is that no infrastructure exists as yet; furthermore, there is a paucity of tested educational models relevant to the learning objectives outlined earlier. On the other hand, an education clearly identified as complementary to the primary cycle is less likely to generate acute expectation gaps than traditional secondary education.

The options available to the Ivory Coast with respect to complementary education concern two related areas of decision:

## A. Curriculum of the Complementary Cycle, including Length of Studies

The preceding analysis suggests the desirability of general education and work-orientation components, with a high degree of flexibility in response to the various ages, educational attainments and interests of admitted pupils. Two main options can be contemplated with respect to length of studies and curriculum structure:

- One (first model) is a three-year cycle, providing alternative graded curriculum sequences which admitted pupils would normally be expected to complete.

- The other (second model) is a non-graded, variable-length cycle offering a variety of short and long courses, and which pupils would normally attend through their 15th year.

Under the second model, the complementary cycle could accept pupils who failed to gain admission to sixième at the end of their first CM2 year and intend to renew their candidacy. This suggestion of the Service Autonome would eliminate CM2 repetitions which currently run at the rate of 85 for every 100 pupils reaching that class. Students working toward the examination could divide their time between academic review courses in the areas where their preparation is weak, and occupational orientation or training courses. Not only would this approach eliminate repetitive instruction of no value to candidates, but those who never succeed in gaining admission to the secondary system would end up with a useful complement of work-oriented education.

This outline of possible curricula under the two models is adequate for the rough cost projections carried out in Part Two. It should be clear, however, that a much larger pool of resources and expertise need be applied by Ivorian authorities in order to determine the optimum content and structure of the instruction to be provided in the complementary cycle.

### B. Rate of Growth of Enrollments in the Complementary Cycle

The computations presented in this document are based on optimistic projections of entry and retention rates by 1985, the proportion of qualified students who actually enroll rising progressively up to that date.

The number qualified for enrollment in the cycle will, itself, depend on two factors: (a) policies pursued with respect to scheduling of access to the secondary system; and (b) which of the two models of complementary education described under (1) is adopted. Since the first of these conditions also determines new enrollments in sixième, and both together affect total enrollment in the CM2 class, all categories of enrollments following the first year of pupils in CM2 are projected jointly in the following chapter (IV), dealing with the scheduling of access to post-primary education.

## IV. SCHEDULING OF ACCESS TO POST-PRIMARY EDUCATION

### A. Control of the Rate of Access to Sixième: Alternative Instruments.

The rate of access to sixième is defined with reference to pupils reaching the CM2: it is the percentage of such pupils eventually admitted to sixième. A given rate of access can be obtained through various combinations of (a) rates of admission and (b) cumulative rates of CM2 repetition. The rate of admission is defined as the percentage of each CM2 class admitted to sixieme in the following academic year. The cumulative rate of repetition is the number of years repeated per 100 students reaching the CM2; it differs from the simple "rate of repetition," which designates the percentage of each CM2 class repeating during the next academic year.

For example, a 44% rate of access can be reached by CM2 cohorts based on the current 24% admission rate and a 84% cumulative repetition rate: for 100 students reaching the CM2, there will be (100 + 84) x .24 = 44 admissions. The same rate of access could, however, be obtained by any combination of admission rate ($r_a$) and cumulative repetition rate ($r_c$) such that (i) $r_a$ is less than 44% and (ii) $100\ (1 + r_c)\ r_a = 44$. For example:

$r_a = 30\%$ $r_c = 47\%$

$r_a = 40\%$ $r_c = 13\%$

The two determining rates are not independent of one another, nor are they set directly by education authorities. Rather, they jointly result from the interaction of various public decisions and individual behaviors:

(1) The admission rate far exceeds the passing rate of pupils taking the examination for admission to sixième in the public system. At present, less than 14% of all candidates are passed, while the admission rate stands at 24%. The differences is explained by "parallel" (public system) and "paying" (private system) admissions that by-pass the examination. The pressure for either type of admission, given the examination passing rates, is affected by limitations placed on CM2 repetitions (or on re-examinations), and the size of "paying" admissions depends in turn on the availability and cost of private secondary education (which now accounts for 1/3 of all new enrollments in sixième). Both the efficiency and the equity of the selection of individuals for secondary education could be improved by admitting a higher percentage of students through examination, i.e., by raising the passing rate closer to the desired admission rate and reducing parallel entries correspondingly.

(2) The cumulative repetition rate depends not only on the admission rate (which determines what percentage of CM2 pupil must repeat if they are to gain admission at a later date) and on whatever direct or indirect limits are placed on repetition by school authorities; it is also affected by (i) the way in which repetition affects the competitive position of pupils in the next round of admissions, (ii) the disposition of rejected pupils to renew their attempt, and (iii) alternatives offered by private education. To the extent that each cohort of CM2 entrants must compete with pupils from other cohorts, the rate of growth of new CM2 enrollments also affects the outcome.

As previously noted, the current rate of admission to sixième is 24%. The repetition of pupils intent on admission in the public secondary system is indirectly controlled by the age limit of admission to sixième: 15 years within the calendary year.* Public schools allow their pupils to repeat as long as their enrollment is consistent with this limit. Pupils bound for the private secondary system and enrolled in private schools can, in principle, repeat more years, but they can gain admission without doing so. _No quantitative information bearing directly on individual responses to these (or other) conditions was available for the present study_. A number of working assumptions had to be substituted for the missing behavioral model in order to generate the required projections of pupil flows. These assumptions are listed in section C. below.

## B. _Cost-benefit Evaluation of Alternatives_

Repetitions are generally viewed as inefficient, with the result that a preference is generally expressed by policy makers for student flows exhibiting low rates of repetition. In the present context, such an approach would mandate the setting of an admission rate close to the desired access rate and the imposition of severe controls on CM2 repetitions. It should be kept in mind, however, that repetitions at the CM2 level generate benefits as well as costs.

(1) _On the cost side_, the main component is the loss of alternative earnings or learning on the part of pupils who never succeed in gaining admission to the secondary system. In future

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*The age limit is actually specified with respect to the examination for admission to sixième.

years, the foregone alternative will be that of a work-oriented education within the complementary cycle, although the loss could be greatly mitigated if, following suggestions of the Service Autonome, second and third preparations of the sixième entrance examination are in fact carried out within the new cycle and leave room for a complement of other courses.

For students who do eventually gain admission to sixième, there is no loss from repetition if the learning acquired during repeated years is essential to their successful pursuït of secondary education. If, on the other hand, the admission rate is so low as to exclude from the current selection pupils who could immediately benefit from secondary training (and will be permitted to do so after one or several repetitions), there is a clear social waste in the form of postponed entries into the labor force.

(2) The allowance of substantial repetitions does, however, generate important benefits of the same nature as those described earlier in Chapter III. The probability of obtaining an efficient and equitable selection of pupils for the secondary system is greatly enhanced by allowing students reaching the CM2 several chance to compete -- as well as some additional years to prove their aptitude. The problem is made more acute by the existence of a private school system in which repetitions cannot be directly controlled: Were public-school pupils prevented from repeating up to the present age limit, their chances of admission through examination would be reduced in relation to those of private students.*

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*Opportunities can be made less unequal through a tighter form of indirect control: disqualification from future admission in the public secondary system of all pupils earning less than a given mark in the entrance examination. Private-school pupils would still retain an advantage, however, since (a) the schools could have them repeat the CM2 "ahead of time," i.e., until they are ready to take the examination with a chance of success, and (b) they are also more likely to have access to private secondary education.

This would only enhance existing inequalities, since private-school pupils are also the more likely to benefit from parallel or paying admissions. A liberal repetition policy can also be expected to increase the satisfaction of popular demand -- by creating a heightened perception of access to secondary education -- given any selected rate of effective access to sixième.*

## C. Main Policy Option: Control of Repetitions

Based on the preceding considerations, it appears that an excessive reduction in allowable repetitions would be neither desirable nor practicable. The range of options to be considered with respect to control of CM2 repetitions -- or, more generally, additional years of preparation for admission to sixième -- reflects this evaluation.

Only two alternatives are considered, both of which limit the number of CM2 repetitions to two (or the number of examination years to three). Additional rules must be specified in each case, so that the following percentages of rejected pupils repeat after their first and second attempt at gaining admission: Under option 1, 80% and 50%; under option 2, 50% and 50%. Percentages under the first option (loose control) generate roughly the same student flow as the current repetition pattern, although the latter trails off over additional years. The second option (tight control), on the other hand, results in a substantial reduction of the incidence of repetitions.

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*Individuals are much less likely to question the fairness of their rejection following several sets of examinations than if it is irretrievably decided at the end of their first CM2 year.

The simplest rule available for the generation of desired annual repetition percentages is the disqualification of a fixed proportion of failed students from examination in later years. The disqualification rate is specified in terms of failed students not already excluded from further repetition by the age limit. The more students reach the age limit, the less the number to be disqualified in order to generate a given repetition percentage, but the higher the disqualification rate required to achieve a given total of disqualifications. Based on a simulation carried out in Chapte V, and on the assumption that parallel admissions are eliminated, option can be approximated by disqualification of the "lower" 25% of failed pupils (under the age limit), and option 2 by disqualification of the lower 50%.* An accurate specification of disqualification rates, however, would require the collection and analysis of detailed enrollment and examination data, including, in particular, the first results of examinations administered to pupils educated in the TV system.

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*The stability of repetition rates in response to current policies is highly sensitive to the age distribution of pupils at the CM2 level. In the traditional school system, 2/3 of the pupils complete their first year of CM2 between the ages of 13 and 15, so that they are limited to zero, one or two repetitions in accordance with the examination age limit. The percentage of repetitions could go much higher if a majority of pupils completed their first CM2 at ages 12 and 13, as is now occuring in the TV schools under automatic grade promotion. The proposed alternatives greatly reduce the impact of age distribution on number of repetitions. However (see Chapter V), the achievement of desired repetitions in the traditional system during the transition to generalized automatic promotion may require a one-year increase in the examination age limit.

## D. Interaction of Options Governing Post-primary Enrollments.

Enrollments in the complementary cycle and admissions to the secondary cycle are controlled by (i) the selection of a model of complementary education and (ii) the selection of an option within any two of the following three decision areas: rate of access to sixième, rate of admission and control of repetitions toward the entrance examination. The classification of policies or "scenarios" reviewed in this study is based on options relating to the rate of access and the control of repetitions. This means that the desirable admission rate is specified as a function of options selected in the latter areas.*

To the extent that (1) the choice of rate of access and control of repetitions affects the number of repeated preparations to the sixième entrance examination, and (2) these preparations, under the second model of complementary education, are shifted from the CM2 to the complementary cycle, the options that govern post-primary enrollments have a strong residual effect on CM2 enrollments. It is thus logical to review the impact of alternative combinations of the three sets of options simultaneously in both areas. This is done in Appendix Table A3 in accordance with the following model:

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*Given the repetition percentages of failed pupils in the first and second year, an appropriate rate of admission can always be calculated to generate the desired rate of access. The calculation is quite simple if it is assumed that the percentage gaining admission each year is equal for all classes of pupils, whether first-year or repeaters.

If, under this assumption, the admission rate is k, and the percentages of failed pupils repeating after the first and second year are $\alpha$ and $\beta$ respectively, k is related to the rate of access $r_a$, by:

$$k[1 + \alpha(1 - k) + \alpha\beta\ (1 - k)^2] = r_a$$

The relationship serves to estimate the proper rate of admission given the desired rate of access and the selected option respecting control of repetitions (associated parameters $\alpha$ and $\beta$).

- Each sub-table describes the flow of 100 first-year CM2 pupils under one of six combinations of (a) rate of access to sixieme (3 options) and (b) regulation of repetitions (2 options).

- The flow in each sub-table is calculated under the two options specified with respect to complementary education:

Option 1: Complementary education functions in accordance with the first model (sequence of three years with alternative graded curricula), and preparation for the sixième entrance examination after the first CM2 year is carried out through repetition of the CM2 class.

Option 2: Complementary education is provided in accordance with the second model (ungraded offering of short and long courses normally available up to age 15), and all preparations for the entrance examination after the first year in CM2 -- except those of private school pupils -- are transferred to the complementary cycle.*

- The flow of secondary school students is not described beyond admission to sixième, since flow parameters beyond that point are specified under a different set of options (choice of diagram 1, 2 or 3). The student flow in the complementary cycle is fully described. Note, however, that the flow calculated under the second model includes all repeaters of the preparation to the sixième entrance examination, whether in public or in private schools.**

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*The initial projection is obtained as the sum of complementary cycle enrollments under option (1) and CM2 repetitions projected under that option. However, all enrollments projected under option (1) beyond the third year (from the year of first enrollment in the CM2) are cancelled, since most pupils would then exceed the normal age limit of 15.

**Complementary cycle enrollments in Part Two are first projected on the basis of flows calculated in Table A3. Under the second model, repetitions of private school pupils are subsequently netted out.

## E. Special Features of the Enrollment Projection

The transition from the present flow pattern to that projected under each set of options is assumed in all cases to take place over the period 1977-1985. The selected transition parameters are described in Part Two, where enrollment projections are actually carried out. In the case of complementary education, however, the transition process raises special problems and calls for additional adjustments:

- One difficulty results from the scheduled extension of automatic promotion to all parts of the primary system (see Chapter V). The rates of entry and retention underlying enrollment projections in the complementary cycle are consistent with the low average age of CM2 cohorts projected under generalized automatic promotion, but would imply a substantial carry-over of pupils beyond the age of 15 under the current age distribution.* While some over-age enrollment could, indeed, be permitted during the transition period (in the first model to allow completion of the three-year curriculum, in the second to accomodate the desired quota of repeated preparations to the sixième entrance examination), a large volume of older students is not likely to materialize. Thus, actual enrollments will fall short of the projected level until automatic promotion in the primary grades is firmly established.

- Other major drags on the size of enrollments in the complementary cycle during the early years are, on the one hand, the low valuation which families will place initially on this new form of education and, on the other, the logistical problem of developing adequate facilities.

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*The percentages entering the cycle each year under the first model are set in relation to the number of pupils who neither repeat nor enter sixième the next year. The percentages are set optimistically at 90%, 80% and 70% respectively for pupils in their first, second and third year of CM2. Net retention between grades (CC1 to CC2 and CC2 to CC3) is set at an arbitrary 80%.

- Accordingly, and with the exception of student years imputed to preparations of the sixième entrance examination under the second model, complementary enrollments initially projected in Part Two in accordance with Table A3 are reduced up to 1985, the cut decreasing progressively from a drastic 80% in 1977 to 0 in 1985.

## V. PROBLEMS OF TRANSITION: OUTPUTS OF TV AND TRADITIONAL PRIMARY EDUCATION

A number of controversial issues are currently alive in the Ivory Coast, concerning the transition of pupils educated in TV primary schools to the first cycle of secondary education. The first group to complete its primary education in TV classes reached the CM2 in the previous academic year (1976-77), and is currently seeking access to secondary education. This group was 18,000 strong and represented 23% of all pupils reaching the CM2 in 1976. By 1980, however, the number of pupils finishing their primary education in TV schools will have grown to over 25,000, or 66% of the total, and by 1990 the percentage will be 84%.

The concerns expressed with respect to the transition of TV pupils are manifested at three levels.

### A. Performance of TV Pupils in the Secondary cycle

Because the attitudes and aptitudes developed through the TV schools (inclusive of all pedagogical innovations) are substantially at variance with those produced by the traditional system, it is feared that new TV generations will not benefit adequately from the type of education currently offered in Ivorian secondary schools. In its more positive (and official) version, the argument is that TV pupils exposed to traditional secondary teaching will lose the benefit of innovations introduced earlier in their education career. The view more often expressed by both friends and foes of television education, however, is that pupils emerging from TV schools will have difficulties competing with their colleagues from the traditional system.

Since the pedagogical evaluation undertaken by the Service d'Evaluation with Belgian assistance will not reach CM2 pupils for some time, and since no attempt was made to administer comparative tests on a sampling basis to recent CM1 (or new CM2) pupils in both types of schools, the validity of these misgivings cannot be rated with much confidence. The impression gathered by some outside observers of classes under both régimes, however, is that the gap between TV and traditional pupils has been unduly emphasized.* There is much of the traditional that remains in TV classes (where effective exposure to TV programs averages only 10 minutes per period), and traditional classes have been affected, in turn, by the pedagogical innovations introduced in connection with TV education. The achievement profile generated by one learning mode may, indeed, differ in some respects from the profile produced by the other, but both profiles are likely to translate into fairly similar apptitudes for secondary education.

As long as similar proportions of student cohorts are admitted to the first cycle from either system, there is thus reason to expect that (i) TV pupils will do as well as, or better than, pupils of similar background originating from traditional schools, and (ii) TV pupils will benefit from their secondary education to the same extent as others. This does not mean, on the one hand, that educational methods in the first cycle of Ivorian secondary education are not in need of reform -- to the benefit of all pupils -- or, on the other, that TV pupils would not benefit from adaptive measures applied during their year in CM2. To the extent, for instance, that TV teaching has de-emphasized formal testing and written work, reintroduction of these components in CM2 classes could substantially improve the performance of TV pupils in sixième. It is also apparent that the transition will be facilitated for those same pupils if modern audio-visual means are incorporated in secondary teaching, even on a modest scale.

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*The blame for exaggerated Ivorian perceptions of the difference in school products rests in part with the bloated lyricism of international media buffs in their praise of TV education, and in part with the constant readiness of conservative elements to proclaim the failure of educational innovations without the benefit of proof.

### B. Access to the Secondary System

In the same perspective, fears are expressed that the examination for admission to sixième in its present form will unduly discriminate against TV pupils. The reason given is that the skills developed through the TV school pedagogy differ from those tested in the examination. It is accordingly suggested that a special examination be designed for pupils issuing from TV schools, with the implication that it should result in a rate of admission at least as favorable as the examination administered to traditional pupils.

Some of the difficulties to be encountered by TV pupils simply result from their lack of familiarity with examination formats, and they could be remedied through appropriate drills during the CM2 year. On the other hand, the balance of acquired skills may, indeed, vary sufficiently between the two groups than an examination designed to evaluate secondary-school aptitudes within one group would provide erratic or biased measures within the second. Rather than administering two separate examinations, however, the possibility of broadening the test battery and, in initial years at least, applying different ponderations to test components in accordance with pupil origin, should be explored at once. There is, in any case, ample reason to reform the present examination, even from the standpoint of admissions from the traditional system.

Some questions remain as to whether a "fair" system of examinations would necessarily result in an approximate equalization of admission rates. For the two systems to perform equally well on an examination which, while variable in its content, is meant to select in accordance with a single criterion (projected performance in secondary studies), each must exhibit similar distributions of its CM2 pupils in terms of aptitude for secondary education. The latter condition, however, cannot be taken for granted: even though the two systems may produce fairly similar aptitudes when applied to similar individuals, the aptitude distributions in CM2 will show significant differences if one of the systems has a less advantage clientèle thant the other, or allows a higher percentage of entrants to reach the CM2. Because TV education excludes the advantaged class of pupils registered in private schools and operates on the principle of nearly automatic promotion, it has been suggested that CM2 classes in TV schools would, indeed, exhibit lower average aptitudes than corresponding classes in the traditional system.

This expectation is not well founded, however, since, on the one hand, the presence of private school pupils in the traditional sector is (and will be) counterbalanced by the inclusion of pupils from the more remote village areas and, on the other, automatic promotion is rapidly taking hold in the traditional sector as well. While less than 50% of pupils entering the traditional primary system in 1963 ever reached the CM2, the percentage was nearly 75% for those who entered in 1968, and it will reach 87% for those who came in 1973. If the transition rates projected by the DOGE and the Service Autonome actually become implemented, the completion rate will be stabilized at 95% for cohorts entering the system after 1975. By comparison, the first TV school cohort will have achieved a completion rate of about 85%, and stabilization at the same 95% level is projected for all TV school cohorts entering after 1973. Thus, the difference between systems for pupils reaching the CM2 in 1976 and beyond will be negligible.

Meanwhile, the disadvantage suffered by pupils reaching the CM2 through TV schools is likely to be compensated by the lower standards of admission to sixième currently applied to young candidates. As already noted, TV pupils in their first CM2 are nearly a year younger, on the average, than their counterparts in traditional schools, so that whatever automatic promotion may have taken from them in the way of average preparation level will be returned in the form of a more favorable treatment in the entrance examination. Were TV pupils allowed to repeat the CM2 under current rules, their rate of access would receive another boost from their having more opportunities to retake the examination under the age limit (15 years).

## C. Congruence of Pupil Flows

This potential for equalized treatment is upset, however, by the apparent determination of Ivorian planners to limit repetitions among pupils reaching the CM2 *via* TV schools down to a fraction of the repetitions observed in the traditional system (currently 85 repetitions for every 100 pupils reaching the CM2). The corresponding percentage of CM2 repetitions proposed for TV schools in early 1976 was as low as 11.

To establish a common 44% access rate under the specified repetition percentages requires that the admission rate of CM2 pupils in sixième be 40% for TV pupils and only 24% for traditional students.* Since such a degree of disparity is neither fair nor likely to be well received by the clientèle of traditional schools, it was proposed by experts of the Service Autonome that the admission rate for TV classes be set at 40%, but that the admission rate of traditional CM2 classes (now 26%) be raised progressively to the same 40% over a ten-year period, with a simultaneous decrease of their repetition percentage calculated to keep the access rate at a constant 44%.

Some of the support for this policy is grounded in the notion that the low repetition rate achieved in TV schools should naturally extend to their CM2 class, while students from the traditional system are bound by the converse principle to cool their heels in the CM2. It ought to be clear, however, that the high percentage of repetitions in traditional CM2's (the only ones observable so far) does not constitute an independent policy of the primary system: it results initially from admission (including examination standards) of the secondary school system, which currently allow only 24% of each CM2 class to enter the secondary cycle. As long as such standards are maintained, the achievement of a 44% rate of access will require that some 85 repetitions be allowed for each 100 pupils reaching the CM2. Conversely, the low repetition percentage sought by TV schools can only come about through a lowering of standards of admission to sixième, to the point where 40% of each CM2 class is accepted each year. That low percentage, furthermore, can be achieved just as quickly by traditional schools if the same lower standards of admission are applied to their pupils as to those emerging from TV schools.

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*See page 39 for definitions. The admission rate relates to the total enrollment of CM2 classes and covers all pupils admitted to sixième before the next academic year, whether through examination or through "parallel" and "paying" channels. The access rate relates to the cohort of pupils reaching the CM2 (first-time enrollment) and similarly includes all channels of admission.

The rationale offered by the Service Autonome for lowering repetitions and raising admission rates among TV pupils is far more defensible: It rests on the observation that, given the relatively young age of students reaching the CM2 through TV schools, and thus the large number of repetitions which they can afford under the examination age limit, the low admission rate currently in effect in traditional education would result in a large cumulation of repeaters and bloat CM2 classes in the TV system.

This point is illustrated in Table 5, based on a set of parameters that capture the general characteristics of (i) the age distribution of new CM2 pupils in each system, and (ii) their admission rates under specified common examination standards, assuming that all failed students repeat the CM2 until the age limit (15) and that parallel admissions are excluded.* If rejected candidates do, indeed, repeat as long as they are allowed to, the traditional system generates a 43% rate of access with 96 repetitions per 100 pupils reaching the CM2, while the TV system ends up with a 48% rate of access and 158 repetitions Assuming that 10% of potential repeaters drop out before enrolling, the repetition percentages are 86 and 142 respectively. This means that CM2 classes in TV education would be even more overloaded than they are currently in the traditional system, with adverse effects on the cost and internal efficiency of primary education.

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*All parameters used in the illustration are rounded estimates based on non-numerical descriptions of the actual situation. They may differ substantially from parameters calculated by the Service Autonome on the basis of actual examination data.

While all this is certainly true, it is just as evident that the age differential between new CM2 pupils in the two systems can be overcome without creating gross inequities in the rate of admission. By allowing all students only one repetition, the rate of access in both systems is equalized at 37%, and repetition percentages drop to a common range: 53 in traditional education, 69 in TV education.* If, more generously, two repetitions are allowed and the examination age limit is raised by one year, the rate of access is 47% in both systems with, however, high levels of repetition all around: 110 in traditional schools, 126 in TV schools. The repetition percentages can be cut through the simple expedient of barring a fraction of failed candidates from further examination.** If that fraction is 25%, repetitions per 100 students reaching the CM2 fall to 82 and 91 respectively, and the terminal student flow in both systems accords with the pattern specified for a "loose" control of repetitions in IV C. If the fraction is 50%, repetitions drop to 47 and 51, and the terminal flow in both systems is consistent with the pattern specified for a "tight" control of repetitions. These results -- detailed in Table 5 -- clearly establish the feasibility of applying common rules and generating common patterns of admission and repetition in traditional and TV education.*

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*The rate of access can be raised to the 40-50 level by increasing the average admission rate.

**The following calculations (see Table 5) assume that the number of admissions is unaffected by the previous elimination of low-performance candidates.

While some more recent documents of the Service Autonome** appear to move away from the advocacy of extreme disparities in the conditions of admission from each system, and also recognize the value of maintaining a substantial rate of repetition at the CM2 level, there is still a strong adherence to the principle of higher admission rates for TV pupils. One must hope that the continuing process of evaluation and analysis carried out jointly by the Service Autonome, the DOGE and the Ministère du Plan will eventually produce a less arbitrary solution to the problem posed by age differences in the transition period. On their side, the promoters of primary TV education should recognize that the principle of automatic promotion through all primary gradues is in no way sullied by the allowance of repetitions at the point where admission standards of the next cycle must be met.

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*An additional "equalizing" pattern is generated in Table 5 by elimination of 15% of failed candidates after the first CM2 and 50% after one repetition.

**Projections d'Effectifs, de Classes et de Maîtres pour l'Enseignement Primaire (1975/76 à 1985/86).

## Table 5: Simulation of Alternative Regulations of CM2 Repetition

### A: Specification of Parameters

(1) Implicit age distribution of 100 pupils reaching the CM2

| No. examination years permitted under the age limit | 4 | 3 | 2 | 1 |
|---|---|---|---|---|
| Pupils of traditional system | 20 | 30 | 30 | 20 |
| Pupils of TV system | 50 | 40 | 10 | -- |

(2) Admission rates (see below for specifications)*

a. Traditional System

| No. examination years permitted under the age limit | | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|
| Percent admitted | | | | | |
| | Year 1 | 35 | 25 | 20 | 15 |
| | Year 2 | 25 | 25 | 20 | (15) |
| | Year 3 | 20 | 20 | (15) | |
| | Year 4 | 15 | | | |

b. TV System

| No. examination years permitted under the age limit | | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|
| Percent admitted | | | | | |
| | Year 1 | 25 | 20 | 15 | -- |
| | Year 2 | 20 | 20 | 15 | -- |
| | Year 3 | 15 | 15 | (10) | |
| | Year 4 | 10 | | | |

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*The admission rates are projected for a common examination under which 22% of traditional CM2 pupils are admitted, and on the assumption that all pupils who fail the examination repeat until they either pass or reach the age limit. The lack of selectivity in the TV system (near automatic promotion) is reflected in lower admission rates overall. The relative magnitude of rates within each system is meant to reflect the relation of age at examination time to admission standards and (especially in the traditional system) to student aptitude level.

## Table 5: Simulation of Alternative Regulations of CM2 Repetition

### B: Projection of Repetitions and Admissions

### (1) Free repetition up to the current age limit

| No. exam. years | 4 | | 3 | | 2 | | 1 | | Repet. | | Admit. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| a. Traditional | R | A | R | A | R | A | R | A | | | |
| Year 1 | (20) | 7 | (30) | 8 | (30) | 6 | (20) | 3 | (100) | | 24 |
| Year 2 | 13 | 3 | 22 | 5 | 24 | 5 | | | 59 | | 13 |
| Year 3 | 10 | 2 | 17 | 3 | | | | | 27 | | 5 |
| Year 4 | 8 | 1 | | | | | | | 8 | | 1 |
| | | | | | | | | | 96 | (86)* | 43 |
| b. T.V. | R | A | R | A | R | A | R | A | | | |
| Year 1 | (50) | 13 | (40) | 8 | (10) | 2 | | | (100) | | 23 |
| Year 2 | 37 | 7 | 32 | 6 | 8 | 1 | | | 77 | | 14 |
| Year 3 | 30 | 5 | 26 | 4 | | | | | 56 | | 9 |
| Year 4 | 25 | 2 | | | | | | | 25 | | 2 |
| | | | | | | | | | 158 | (142)* | 48 |

### (2) Limit of one repetition - Current age limit

| No. exam. years | 2 | | 2 | | 2 | | 1 | | Repet. | | Admit. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| a. Traditional | R | A | R | A | R | A | R | A | | | |
| Year 1 | (20) | 7 | (30) | 8 | (30) | 6 | (20) | 3 | (100) | | 24 |
| Year 2 | 13 | 3 | 22 | 5 | 24 | 5 | | | 59 | | 13 |
| | | | | | | | | | 59 | (53)* | 37 |
| b. T.V. | R | A | R | A | R | A | R | A | | | |
| Year 1 | (50) | 13 | (40) | 8 | (10) | 2 | | | (100) | | 23 |
| Year 2 | 37 | 7 | 32 | 6 | 8 | 1 | | | 77 | | 14 |
| | | | | | | | | | 77 | (69)* | 37 |

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*Repetitions after 10% deduction for drop outs

## Table 5: Part B (continued)

### (3) Limit of two repetitions - Age limit raised by one year

| No. exam. years | 3 | | 3 | | 3 | | 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| a. Traditional | R | A | R | A | R | A | R | A | Repet. | | Admit. |
| Year 1 | (20) | 7 | (30) | 8 | (30) | 6 | (20) | 3 | (100) | | 24 |
| Year 2 | 13 | 3 | 22 | 5 | 24 | 5 | 17 | 2 | 76 | | 15 |
| Year 3 | 10 | 2 | 17 | 3 | 19 | 3 | | | 46 | | 8 |
| | | | | | | | | | 122 | (110)* | 47 |
| b. TV | R | A | R | A | R | A | R | A | | | |
| Year 1 | (50) | 13 | (40) | 8 | (10) | 2 | | | (100) | | 23 |
| Year 2 | 37 | 7 | 32 | 6 | 8 | 1 | | | 77 | | 14 |
| Year 3 | 30 | 5 | 26 | 4 | 7 | 1 | | | 63 | | 10 |
| | | | | | | | | | 140 | (126)* | 47 |

### (4) Limit of two repetitions - Age limit raised by one year - Exclusion of 25% of failed students from further examinations**

| No. exam years | 3 | | 3 | | 3 | | 2 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| a. Traditional | R | A | R | A | R | A | R | A | Repet. | Admit. |
| Year 1 | (20) | 7 | (30) | 8 | (30) | 6 | (20) | 3 | (100) | 24 |
| Year 2 | 10 | 3 | 17 | 5 | 18 | 5 | 13 | 2 | 58 | 15 |
| Year 3 | 5 | 2 | 9 | 3 | 10 | 3 | | | 24 | 8 |
| | | | | | | | | | 82 | 47 |
| b. TV | R | A | R | A | R | A | R | A | | |
| Year 1 | (50) | 13 | (40) | 8 | (10) | 2 | | | (100) | 23 |
| Year 2 | 28 | 7 | 24 | 6 | 6 | 1 | | | 58 | 14 |
| Year 3 | 16 | 5 | 13 | 4 | 4 | 1 | | | 33 | 10 |
| | | | | | | | | | 91 | 47 |

---

*Repetitions after 10% deduction for drop outs.

**All cells are assumed to be affected uniformly by this exclusion.

## Table 5: Part B (continued)

### (5) Limit of two repetitions - Age limit raised by one year - Exclusion of 50% of failed students from further examination

| No. exam. years | 3 | | 3 | | 3 | | 2 | | Repet. | Admit. |
|---|---|---|---|---|---|---|---|---|---|---|
| a. Traditional | R | A | R | A | R | A | R | A | | |
| Year 1 | (20) | 7 | (30) | 8 | (30) | 6 | (20) | 3 | (100) | 24 |
| Year 2 | 7 | 3 | 11 | 5 | 12 | 5 | 8 | 2 | 38 | 15 |
| Year 3 | 2 | 2 | 3 | 3 | 4 | 3 | | | 9 | 8 |
| | | | | | | | | | 47 | 47 |
| b. TV | R | A | R | A | R | A | R | A | | |
| Year 1 | (50) | 13 | (40) | 8 | (10) | 2 | | | (100) | 23 |
| Year 2 | 18 | 7 | 16 | 6 | 4 | 1 | | | 38 | 14 |
| Year 3 | 6 | 5 | 5 | 4 | 2 | 1 | | | 13 | 10 |
| | | | | | | | | | 51 | 47 |

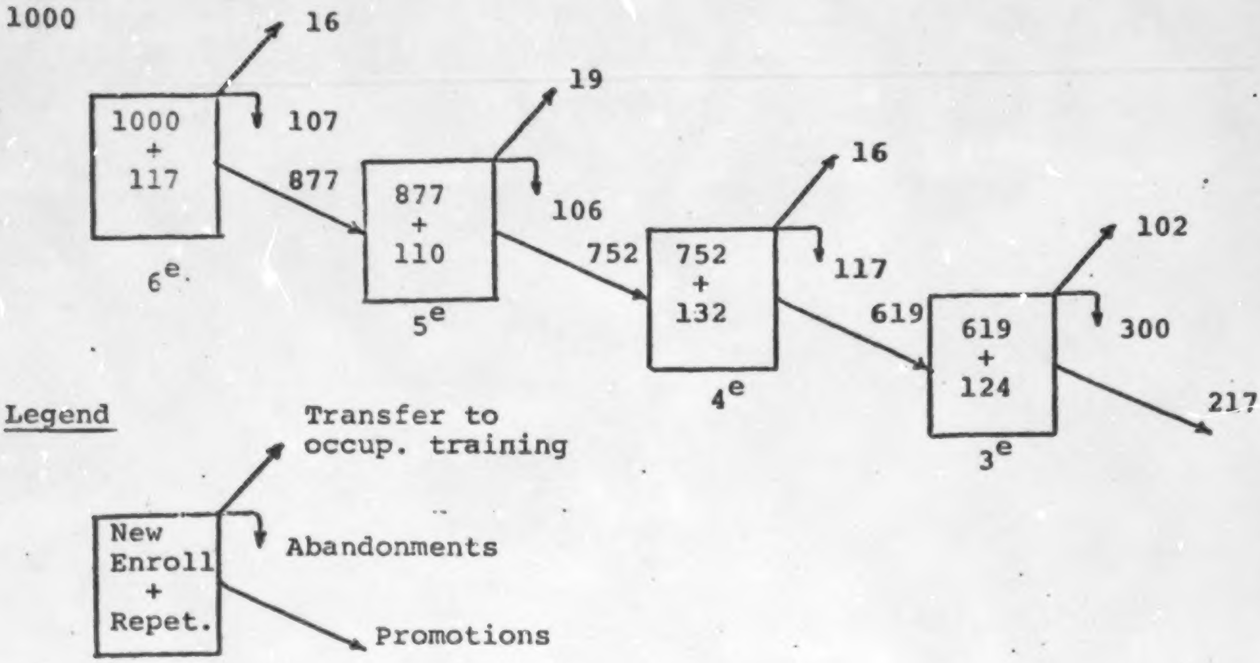
### (6) Limit of two repetitions - Age limit raised one year - Exclusion of 15% of failed students after one year, 50% after two years

| No. exam. years | 3 | | 3 | | 3 | | 2 | | Repet. | Admit. |
|---|---|---|---|---|---|---|---|---|---|---|
| a. Traditional | R | A | R | A | R | A | R | A | | |
| Year 1 | (20) | 7 | (30) | 8 | (30) | 6 | (20) | 3 | (100) | 24 |
| Year 2 | 11 | 3 | 19 | 5 | 20 | 5 | 11 | 2 | 61 | 15 |
| Year 3 | 4 | 2 | 7 | 3 | 8 | 3 | | | 19 | 8 |
| | | | | | | | | | 80 | 47 |
| b. TV | R | A | R | A | R | A | R | A | | |
| Year 1 | (50) | 13 | (40) | 8 | (10) | 2 | | | (100) | 23 |
| Year 2 | 31 | 7 | 27 | 6 | 7 | 1 | | | 65 | 14 |
| Year 3 | 12 | 5 | 10 | 4 | 3 | 1 | | | 25 | 10 |
| | | | | | | | | | 90 | 47 |

## Diagram 1: Summary student flow in the secondary system: Public + Private

(Based on 1973-74 transition & repetition rates)

### A. Flow of 1000 students admitted to sixième (first time)


1000
16
1000
+
117
107
877
6e.
19
877
+
110
106
5e
752
16
752
+
132
117
4e
619
102
619
+
124
300
217
3e
Legend
Transfer to
occup. training
New
Enroll
+
Repet.
Abandonments
Promotions

### B. Additional flow: Transfer from foreign & non-accredited schools

(inc. new accredidation of schools)

(Repetitions not shown)

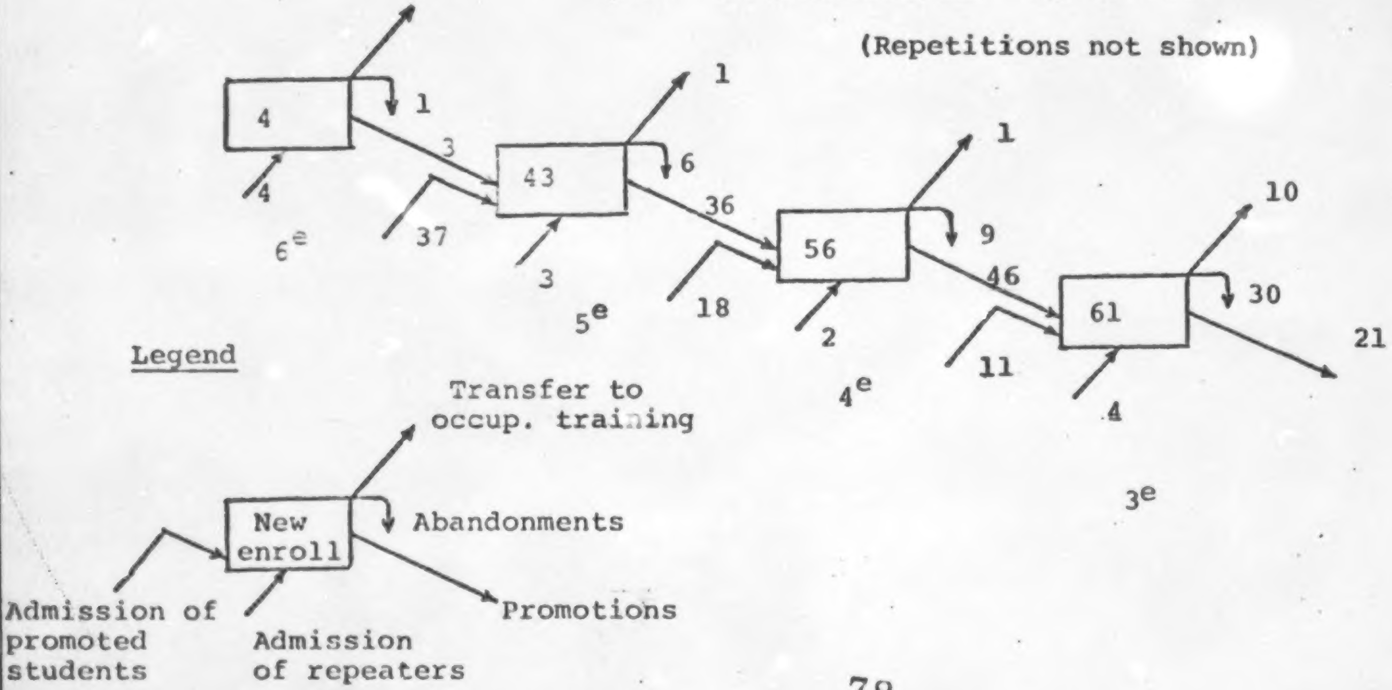

4
1
3
4
6e
1
43
6
37
36
3
5e
1
56
9
18
46
2
4e
10
61
30
11
4
21
3e
Legend
Transfer to
occup. training
New
enroll
Abandonments
Promotions
Admission of
promoted
students
Admission
of repeaters

Diagram 2: Suggested student flow in the secondary system:
Lean policy (30% rate of access to sixième)

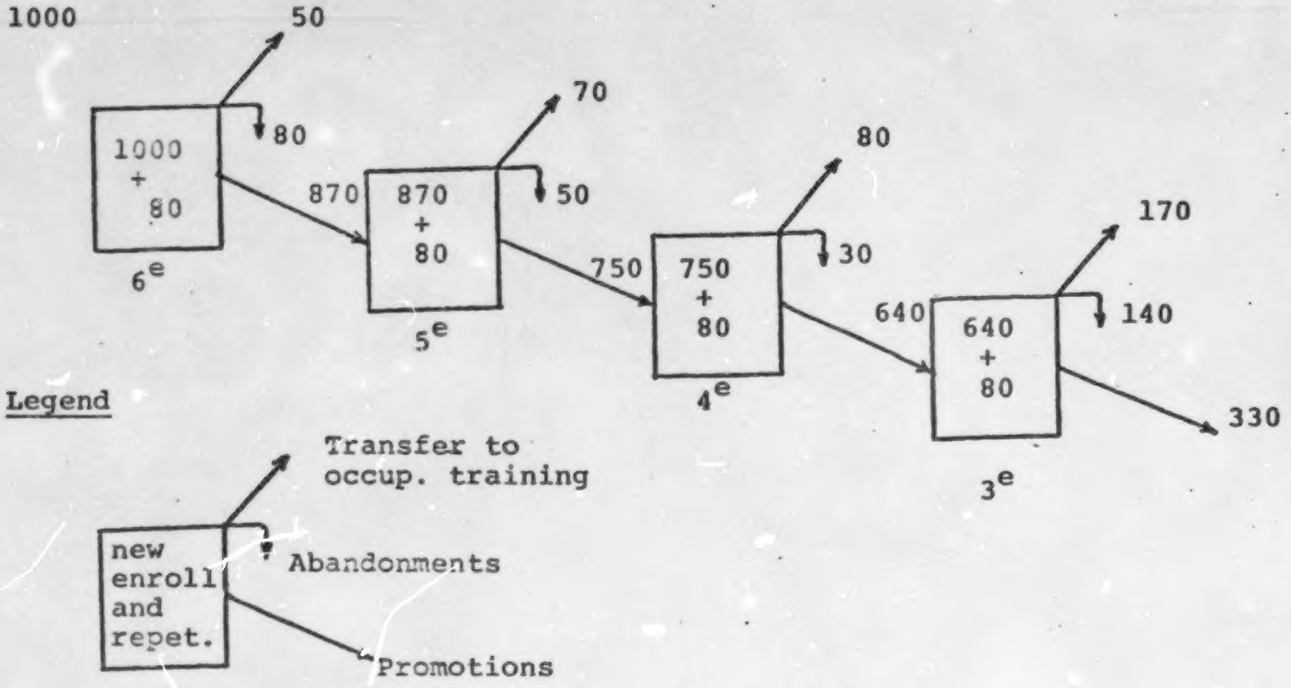
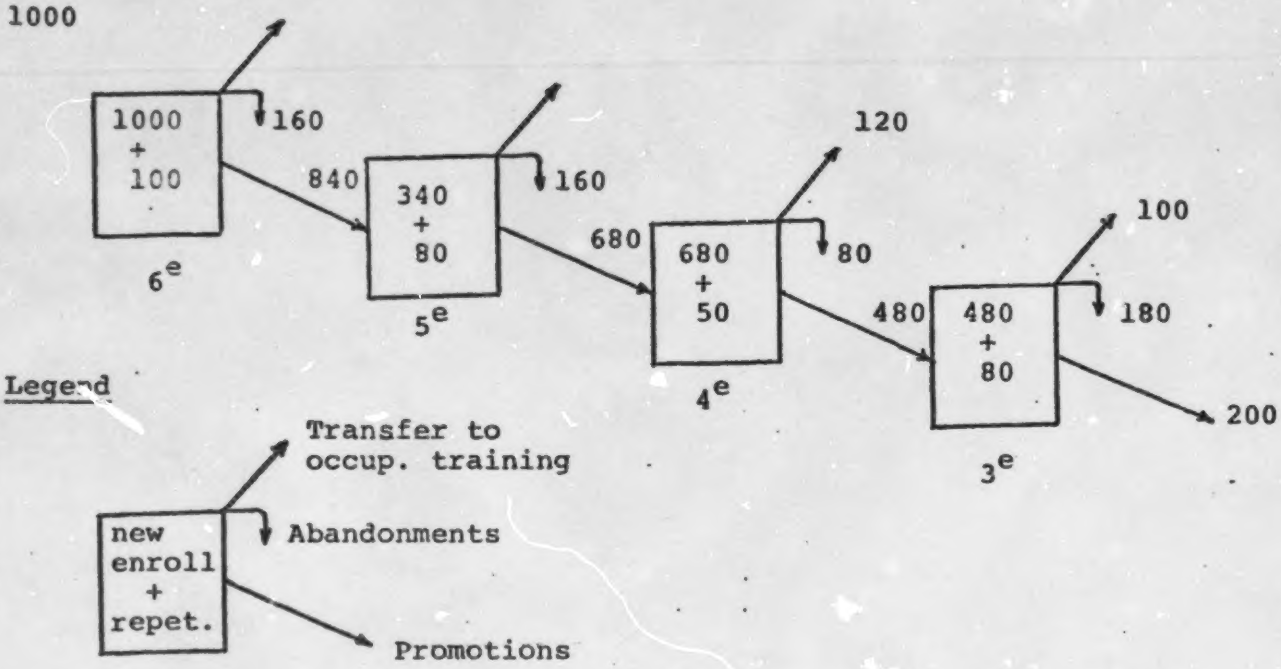

1000
50
1000 + 80
80
6e
870
870 + 80
70
50
5e
750
750 + 80
80
30
4e
640
640 + 80
170
140
330
3e
Legend
Transfer to occup. training
new enroll and repet.
Abandonments
Promotions

Diagram 3: Suggested student flow in the secondary system
Liberal policy (50% rate of access to sixième)


1000
1000
+
100
160
6e
840
340
+
80
160
5e
680
680
+
50
120
80
4e
480
480
+
80
100
180
3e
200
Legend
Transfer to occup. training
new enroll + repet.
Abandonments
Promotions

# PART TWO

## TECHNOLOGICAL ALTERNATIVES

## ENROLLMENT AND COST PROJECTIONS

## I. TECHNOLOGICAL OPTIONS

Several technological alternatives are available in the provision of both secondary school education (first cycle) and complementary education. These have already been explored by the Comité Scientifique* in 1975 and, earlier, by UNESCO;** the short review which follows identifies similar models with, however, some important shifts in emphasis.

Although reports of the Comité Scientifique carry no implications to that effect, there has been an unfortunate tendency among readers to view the identified alternatives as mutually exclusive. While the production of an education serving well-defined objectives and designed for a homogenous population is likely to exhibit a single optimal mode, the variety of external constraints under which delivery to various groups must, in fact, operate calls for the adoption of whichever technology is most efficient in each case. Accordingly, the options reviewed in this section include the parallel utilization of several educational modes in different parts of the system.

### A. Technological Options in Secondary Education (1st Cycle)

#### 1. General Typology

Options in the first cycle of secondary education can be described in terms of two levels of choice:

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*Comité Scientifique Consultatif du Programme d'Education Télévisuelle. 10$^{e}$ Session: Compte-rendu des travaux (1975)

**Mission FAC/UNESCO: Etude des Possibilités d'Introduction de la Technologie Audiovisuelle dans les Enseignements du Second Degré en Côte d'Ivoire (1973)

(a) Percentages of the entering cohort absorbed in each of three parallel educational settings:

- Institutional school education
- Community school education
- Extension or "distance" education

(b) Specific technology (assumed exclusive) within each educational mode.

## 2. Educational Settings and Cohort Distribution

The three educational settings can be summarily described as follows:

- Institutional school education: Education concentrated in an integrated school plant with major input of qualified secondary-school teachers.

- Community school education: Education concentrated in community facilities, with substantial input of teacher/monitors trained at the primary level and strong dependence on centralized services delivered through mail, radio or television. This system appears more efficient than standard schooling in sparsely populated areas, where the cost of standard schools is raised either by the low scale of their operation (if they are dispersed) or by transportation expenses (if they are concentrated). Based on the experience of Mexico, where the system is in effect, the community school may have cost-saving potential in densely populated areas as well; on the other hand, the proportion of their target population which community schools are able to attract is not known, given the very limited scope of the Mexican experiment.

- Extension or "distance" education: Education centered in the home with exclusive input of centralized teaching services delivered through mail and evening radio or television. Such a system functions on the British "open university" model and is most efficient for the education of individuals forced by family circumstances to engage in income-producing activities. Standard or community school education could not, in fact, reach these individuals at all unless substantial scholarships are paid.

Since each of the three settings is the most efficient in relation to one important segment of the target population (admissible individuals), all three should operate in parallel. The decision concerning what percentage of each admissible cohort will be oriented toward each setting must rest on (i) detailed cost comparisons and (ii) information concerning the spatial distribution and work obligations of cohort members.

### 3. Selection of Specific Technology under Each Setting

No attempt is made in this review to compare technological alternatives in community and extension (distance) education. However, specific technologies are suggested in each case and outlined in Appendix A. It should be noted that the community school technology as implemented in Mexico bears a superficial resemblance to the last of the four models identified by the Comité Scientifique.* However, the Mexican system remains highly institutionalized and fairly dependent on traditional teacher/student relationships; in spite of the central role played by television and the disappearance of qualified secondary teachers from the classroom. Structured lectures are presented from the TV screen rather than from the platform, and the monitors attempt a close imitation of the traditional teacher in its roles of drill master and disciplinarian.

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*Comité Scientifique, op. cit.

With respect to institutional school education, three alternatives are retained, corresponding in a general way to the first three models identified by the _Comité Scientifique_,* but with less ambitious reform objectives:

Model 1 (Traditional): Traditional teaching, with marginal introduction of elementary audio-visual means as efficient substitutes for the blackboard and the textbook.

Model 2 (Media Complemented): Traditional teaching, provided by teachers meeting formal standards of qualification currently in effect, but with strong reinforcement from audio-visual materials used under the teacher's control and capable of complementing his instruction. (The main objective is not, as in the perspective of the _Comité Scientifique_, to set the stage for a media-centered renovation of secondary schooling, or to insure that students issuing from TV primary schools will not be "penalized,"** but rather to permit an accelerated Ivorization of the teacher force even as the system expands during the next decade.

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*Comité Scientifique, _op_. _cit_.

**The implication that pupils produced by the TV system cannot survive in a different pedagogical environment is a surprising one, coming as it does from a group evidently committed to the new pedagogy. One would expect a progressive technology to broaden, rather than constrict, the aptitudes of pupils. As argued in Part One, Chapter V, there is good reason to believe that TV pupils will be as capable as others -- and hopefully more so -- to benefit from secondary education in whatever form is available.

Given past deficiencies at all levels of education in the Ivory Coast, and considering the present structure of the education pipeline, it is apparent that any massive effort to train Ivorian personnel for secondary teaching over a short period will result in the production of a high percentage of minimally qualified teachers. It is in such a context that the complement of instructional materials can play a decisive role: as an agent of enrichment and clarification of the teacher's message, and as a device for self-learning by students. Such a role does not exclude utilization of the new components as a means of accelerating educational reform, since the production and distribution of materials would be centrally controlled.

While some open circuit, central transmission may be considered as part of the package, the complementing of teacher instruction (within and without the classroom) would be achieved primarily through the utilization of audio-visual library materials and on-site presentation devices.

Model 3 (Media Based): Massive intrusion of audio-visual resources, with a substantial component of system-wide telecasts, and central control of the teaching process leading to systematic reform. This alternatives is akin in spirit to the concept (if not the reality) or primary TV schools.

## B. Technological Options in Complementary Education

Options in this area have not been adequately surveyed at this stage and cannot be fully specified until a description of the curricula and/or course offerings has been prepared. As previously noted, the description of complementary education models beyond the outlines presented in Part One, Chapter III, requires an independent effort based on the thorough survey of relevant experiments in nations at different stages of their development.

It is apparent, however, that the most significant problem faced by complementary education is one of operating scale. The tailoring of instruction to individual needs which, alone, can make the complementary cycle socially productive, requires the simultaneous availability of different teaching/ learning resources, and thus a minimum enrollment at each location for its production at moderate cost:

### 1. Determination of Minimum Efficient Scale

Under traditional technologies, and assuming that resources applied must not exceed one teacher and room per 40 pupils, learning conditions would change as follows in accordance with enrollment at any location:

(a) 40 pupils. One teacher is employed, covering from 5 to 10 subject/levels in the course of each school day, with various proportions of the student body taught at any one time while the remainder learns independently. This is the model of the "one-room" school familiar in village primary education.

The model has not been very successful, however, except with exceptional teachers. It faces additional limitations at the post-primary level since (i) the teaching of some subjects (especially in technical/vocational fields) requires a degree of specialization which a single teacher cannot achieve in all areas, (ii) the period reserved for these subjects may have to be fairly lengthy and require constant supervision in order to be effective, (iii) the time reserved for independent learning may be poorly used given the uncertain motivation of pupils absorbed in the complementary cycle, and (iv) the size of the class may interfere with a diversified instruction unless the physical space is appropriately (and expensively) adjusted. It is apparent, therefore, that a one-teacher operation could only produce a somewhat undifferentiated education based on the review of primary school materials and some vocational training in agriculture.

(b) 80 pupils. Two teachers are permitted, each with his own specialization in academic and vocational subjects. The academic specialization may be along the lines of language-social studies vs. mathematics-sciences, or compensatory education (upper primary level) vs. continuing education (including repeated preparations to the sixième entrace examination under the second model). The logical specialization in vocation areas is farming and home management vs. manual/mechanical skills.

For the same number of subject/levels taught as in the one-teacher situation, the weight of independent studies can be cut in half, providing some leeway for program enrichment and adequate supervision of vocational activities. Some degree of specialization is achieved in the teaching staff, and activities can be spread over two rooms instead of one at the same unit cost.

(c) 120 pupils. The system utilizes three teachers, allowing the employment of a "polivalent" vocational teacher and two teachers of academic subjects with the type of specialization suggested for the lower enrollment. Programs can be enriched further and independent studies be reduced to the level that is optimum for student learning.

While each further increase in enrollment permits additional improvements, it appears that a tolerable approximation to the objectives of complementary education can be achieved within the specified resource limits when local enrollment reaches 120. This, however, leaves out the requirement for equipment in the teaching of vocational courses. A set of basic non-power tools for agriculture, carpentry and simple mechanical repairs can be supplied to centers of even 40 pupils at moderate cost, and some agricultural land can be made available nearly everywhere in relation to training needs, but a substantially larger enrollment is needed to justify a full inventory of power tools (wood and metal work), demonstration engines and transmission systems, agricultural machinery, home industry (e.g., textile) equipment, etc.

For this equipment to be utilized on a sufficient scale, small schools must either send their pupils to short training sessions at central vocational shops established in each district, or depend on specialized mobile units (with instructor) that spend from one to three weeks in each school for intensive training in a given area. The second approach appears preferable from the standpoint of maximizing pupil access and generating interest among all pupils as well as adults in their community.

The utilization of instructional media, such as televised programs, can considerably enrich the training, in particular by broadening the experience of pupils with respect to the incorporation of vocational skills in actual production situations. Since, however, the share of this instruction cannot be large, and much of it requires monitoring, the incidence of television on personnel utilization will be negligible.

### 2. Limits of Implementation

The problem of scale is essentially a rural one, since enrollments in towns and urban areas will always be sufficient to support an adequate volume of staff and facilities at a low per-pupil cost.

For a substantial village enrolling 250-300 pupils in its primary school and employing six teachers under the traditional system, the complementary cycle enrollment would eventually run to some 30 students under the first model (3-year graded curriculum sequences) and some 40 under the second (free choice of courses up to age 15 and incorporation of repeated preparations to the sixième entrance examination). Under automatic promotion, however, the same village could have as many as 50 pupils enrolled in the complementary cycle under the first model, and 80 under the second -- assuming that repeated preparation for the sixième entrance examination are held at their current level (80 repetitions for each 100 pupils reaching the CM2). Not only, then, could two teachers be justified under the second model, but the fact that a high proportion of pupils are working toward the examination would make it profitable to link the CM2 and the complementary cycle into one system, thus reaching an aggregate enrollment of 120-130 students with three teachers specialized in accordance with the pattern previously described.

This suggests that complementary education can eventually be offered under efficient conditions in all localities where the primary school system employs six teachers or more, as long as the second model is in effect. This limit excludes a substantial number of villages, since close to half of all primary school districts (I.E.P.'s) in the public system average only four teachers per school (1973-74 figures), although their enrollment is only one third of the public primary enrollment and one fourth of all primary enrollments. Wherever the scale is too small to support an efficient complementary cycle, and where the state of communication facilities prevents a majority of pupils from attending regular classes at central localities in the district, the complementary cycle will either have to be abandoned (very small schools) or offered with a limited choice of programs.

## II. RANGE OF POLICY OPTIONS: RECAPITULATION

### A. General Scope of Projections

The set of policy options, or "scenarios," to be considered in the remaining chapters results from the intersection of the seven classes of mutually exclusive options considered in the course of the preceding analysis. Each class of options constitutes a particular decision domain.

The combination of options from the first three classes (rate of access to sixième, control of repetitions, model of complementary education) determines alternative flows of students into sixième, enrollments in the complementary cycle and repetitions in the CM2. Given any schedule of admissions to sixième, options in the next two classes (flow parameters in secondary education and enrollment share of the private sector) generate different enrollments in the first cycle of public secondary education. The remaining options (distribution of first cycle enrollments by educational setting and choice of educational technology) assign a cost to specified post-primary enrollments.

This chapter reviews all classes of options and identifies the restricted set of policy options (i.e., vectors of one compatible option from each class) costed in Chapter III.

### B. Alternative Flows into Post-Primary Education

The following options were identified under the first three classes (decision domains) listed:

(a) Rate of access to sixième (3 options)

| Options. | (1) | (2) | (3) |
|---|---|---|---|
| Rate of access: | 30% | 44% | 50% |

(b) Control of repetition of preparations for sixième entrance examination (2 options)

| Options: | (1) | (2) |
|---|---|---|
| | Loose Policy | Tight Policy |
| | (80% and 50% repetition of rejected candidates in first and second year) | (50% and 50% repetition of rejected candidates in first and second year) |

(c) Model of complementary education (2 options)

| Options | (1) | (2) |
|---|---|---|
| | First Model | Second Model |

The admission rates and flow parameters resulting from all 12 combinations of options under classes (a), (b), (c) are calculated in Appendix Table A3. Annual flows (new enrollment in $6^e$, CM2 repetitions, enrollment in complementary cycle) are projected in Appendix Table A4 up to 1990 for each combination of options. In each case a progressive transition from the present to the selected set of flow parameters is postulated.*

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*The following assumptions are made concerning the transition to new flow parameters following a decision to implement one particular set of options: (a) the flow parameters of pupils entering the CM2 in 1976 are those of subtable (1), Table A3, based on a 44% rate of access and current policies governing repetitions; (b) the flow parameters of each cohort entering the CM2 from 1977 to 1980 shift linearly from their 1976 level to the level calculated under the selected set of options. The actual transition policy would deviate from this model, since new rules affecting admission and repetition would have to be applied on a school-year rather than a cohort basis. The flows resulting from a linear shift of annual rules over a similar time period would not, however, differ substantially from those calculated in Table 4.

The projection of enrollments in the complementary cycle has the following special characteristics:

-- Enrollment in the complementary cycle under the second model in Table A3 is overestimated by the number of repetitions in private schools (since it is assumed that the latter will continue to be performed within the framework of private primary schools rather than be transferred to the complementary cycle). Enrollments in the complementary cycle under the second model are first obtained on the basis of Table A3 parameters. CM2 repetitions in private schools are subsequently netted out to obtain the desired projection.

-- For reasons discussed in Part One, Chapter IV, this projection is modified once again over the period 1977-85. Except for student years imputed to preparation of the sixième entrance examination under the second model, a reduction is applied to all enrollments initially projected, the reduction factor decreasing from 80% in 1977 to 0 in 1985.

## C. Alternative Enrollments in Public Secondary Education (First Cycle)

Given annual admissions to sixième projected under any combination of the preceding options, public enrollments in the first cycle of secondary education are determined over the 1977-1990 period by two classes of options:

(d) Flow parameters in secondary education (3 options)*

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*The transition to new flow parameters in secondary education is parallel to the transition to new flow parameters in the access to post-primary education: The flow parameters of pupils entering up to 1976 are those of diagram 1; the flow parameters of each cohort entering from 1977 to 1980 shift linearly from their 1976 level to the level specified under the selected option.

| Options: | (1) | (2) | (3) |
|---|---|---|---|
| | Diagram 1 | Diagram 2 | Diagram 3 |

In light of the analysis carried out in Part One, Chapter IV, option (2) is only considered in association with the 30% rate of access, while options (1) and (3) are only considered in association with the 44% and 50% rates of access.

### (e) Distribution of projected first-cycle enrollment between public and private system (1 option)

This distribution is based on an independent projection of enrollment in the private system, with public enrollment calculated as a residual. The private enrollment projection is that generated by PROJEDOR, Version 09.

The maximum number of alternative enrollment projections in the first secondary cycle generated by option classes (a) to (e) is only 10 since (i) classes (a) and (d) together produce only five compatible combinations, (ii) each of these can be associated with either option in class (b), and (iii) options under class (c) do not affect secondary enrollments.

## D. Restricted Set of Alternative Enrollment Projections

In order to limit the computational work and provide a legible document, the combinations of options (a) to (d) actually considered in Chapter III are restricted to six, generating six alternative patterns of enrollment. The selected combinations of options are described in Table 6A.

Table 6A: Options Governing Enrollment: Selected Combinations

| Designation of the enrollment policy | I | II | III | IV | V | VI |
|---|---|---|---|---|---|---|
| (a) Rate of access to $6^e$ | 30% | 44% | 44% | 50% | 50% | 50% |
| (b) Control of repetitions toward the sixième entrance examination | tight (50/ 50) | loose (80/ 50) | tight (50/ 50) | loose (80/ 50) | loose (80/ 50) | tight (50/ 50) |
| (c) Model of complementary education | second model | second model | second model | second model | second model | second model |
| (d) Flow parameters in secondary education | Diag. 2 | Diag. 1 | Diag. 1 | Diag. 1 | Diag. 3 | Diag. 3 |

The justification for this particular selection is presented in Chapter III, Sections A and C, and projected public enrollments under each combination of options are shown in Tables 7 (first cycle of secondary education) and 19 (complementary cycle). Detailed projections of first-cycle enrollments by grade, inclusive of private school enrollments, are also reported in Appendix Table A5.

## E. Technological Alternatives in Secondary Education

The technological alternatives introduced in the next Chapter for the computation of education costs are derived from the following two classes of options.

(f) Distribution of public first-cycle enrollment between educational settings (3 options)

| Options: | (1) | (2) | (3) |
|---|---|---|---|
| in institutional education | 100% | 80% | 60% |
| in community education* | 0 | 20% | 30% |
| in extension education* | 0 | 0 | 10% |

(g) Specific Technology - Institutional secondary education (3 options)

| Options: | (1) | (2) | (3) |
|---|---|---|---|
| | Traditional | Complemented** | Media-centered** |

Classes (f) and (g) generate 9 combinations of compatible options. If the 10 combinations identified with respect to the determination of first-cycle enrollments are taken into account, their association with technological options generates a maximum number of alternative cost projections equal to 9 x 10 = 90. When options relative to complementary education are also considered, the number of possible "scenarios" increases to 180.

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*Community and extension education are introduced in accordance with the schedule of enrollment percentages shown in the next footnote, after multiplying all terms in the table by the percentage of enrollments selected for those educational settings.

**The new technologies are introduced in accordance with the schedule of enrollment percentages shown below:

Transition Schedule

(Percentage of enrollment in grade/year educated through new technology)

| Grade/year | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 |
|---|---|---|---|---|---|---|
| $6^e$ | 10% | 20% | 40% | 70% | 100% | 100% |
| $5^e$ | | 15 | 30 | 60 | 100 | 100 |
| $4^e$ | | | 20 | 40 | 80 | 100 |
| $3^e$ | | | | 25 | 50 | 100 |

The cost projections carried out in Chapter III, however, will refer to a sample of only 12 of these scenarios. These result from the association of the 6 combinations of "enrollment" options selected in Section D, Table 6A, with different technological mixes. The table below shows, for each of the alternatives selected under D, which technological options are incorporated to complete the scenario.

| Designation of enrollment policy (Table 6A) | I | II | III | IV |
|---|---|---|---|---|
| Option in class (f) | (1) | (1) | (1) | (1) |
| Option in class (g) | (1) | (1) | (1) | (1) |
| Designation of resulting scenario | [1] | [2] | [3] | [4] |

| Designation of enrollment policy (Table 6A) | V | | | | | | | VI |
|---|---|---|---|---|---|---|---|---|
| Option in class (f) | (1) | (1) | (1) | (2) | (2) | (3) | (3) | (1) |
| Option in class (g) | (1) | (2) | (3) | (1) | (2) | (1) | (2) | (2) |
| Designation of resulting scenario | [5] | [6] | [8] | [9] | [10] | [11] | [12] | [7] |

Table 6B (page 82) provides a recapitulation of the whole sequence of options for each of the 12 scenarios.

The proposed selection of cost projections is intended to provide an effective illustration of the impact of different options in each class. Based on the developed model and data bank, additional projections can be supplied at moderate cost in response to specific requests of Ivorian authorities.

TABLE 6B: SELECTED ALTERNATIVES GOVERNING FIRST CYCLE ENROLLMENTS AND COSTS

| Designation of enrollment policy | [1] | [2] | [3] | [4] | [5] | [6] |
|---|---|---|---|---|---|---|
| (a) Rate of access to sixième | 30% | 44% | 44% | 50% | 50% | 50% |
| (b) Control of repetitions toward the sixième entrance examination | tight (50/50) | loose (80/50) | tight (50/50) | loose (80/50) | loose (80/50) | loose (80/50) |
| (d) Flow parameters through secondary education | diag. 2 | diag. 1 | diag. 1 | diag. 1 | diag. 3 | diag. 3 |
| (f) Distribution by educational setting (secondary) | 100% inst. | 100% inst. | 100% inst. | 100% inst. | 100% inst. | 100% inst. |
| (g) Technology (institutional secondary education) | traditional | traditional | traditional | traditional | traditional | traditional |

| Designation of enrollment policy | [7] | [8] | [9] | [10] | [11] | [12] |
|---|---|---|---|---|---|---|
| (a) Rate of access to sixième | 50% | 50% | 50% | 50% | 50% | 50% |
| (b) Control of repetitions toward the sixième entrance examination | tight (50/50) | loose (80/50) | loose (80/50) | loose (80/50) | loose (80/50) | loose (80/50) |
| (d) Flow parameters through secondary education | diag. 3 | diag. 3 | diag. 3 | diag. 3 | diag. 3 | diag. 3 |
| (f) Distribution by educational setting (secondary) | 100% inst. | 100% inst. | 80% inst.<br>20% com. | 80% inst.<br>20% com. | 60% inst.<br>30% com.<br>10% exten. | 60% inst.<br>30% com.<br>10% exten. |
| (g) Technology (institutional secondary education) | w/ media support | media based | traditional | w/ media support | traditional | w/ media support |

## III. PROTECTION OF EXPENDITURES UNDER ALTERNATIVE POST-PRIMARY EDUCATION POLICIES

### A. Plan of Study, Definitions and Methodology

The twelve alternatives selected in the preceding chapter with regard to secondary education, and their associated options respecting the complementary cycle, do not cover the entire range of possible scenarios. They are nevertheless sufficiently varied to provide a good sampling of available options and probably include the extreme assumptions that can realistically be made concerning the development of secondary education in the Ivory Coast.

It seems essential to envisage these scenarios in the light of the cost of their implementation to the Ivory Coast economy. This analysis of costs as a function of alternative development profiles is not properly speaking a sensitivity analysis - - a technique that requires the computation of complex cost functions, obscure to administrators and decision-makers alike - - but the range of options actually considered comes close to providing such an analysis and permits a fair estimate of the economic impact of any selected rate of access or specific technology.

The analysis proceeds in two stages: The first is concerned with the first cycle of secondary education, from sixième through troisième, which normally leads students into the second cycle. The second stage deals with the complementary cycle: a new receiving structure disguised to serve students included from secondary schooling, and which attempts to resolve the thorny problem created in the Ivory Coast by early school leavers. Our conclusion will be both a recapitulation of total costs according to the alternative selected and an analysis of results from the standpoint of the "choices" impled by each scenario.

The computation deals with annual expenditures imputable to the activities described for the period 1977-80, on the assumption that financing is through current resources. At the risk of creating certain confusions, but in keeping with governmental practice, the term "costs" is used interchangeably in most of this remaining chapter. Thus annual cost, as understood in this report, includes all yearly gross investment expenditures, but excludes any amortization or interest charge.

The various simplifications made in the course of this computation tend nearly always to generate underestimates of the cost (expenditures). The main reasons for this bias are (i) the omission of teachers training costs; (ii) the assumption of no marginal cost for the use of personnel and equipment attached to the existing ETV Complex (i.e., the Complex operates below full capacity); and (iii) the affectation of all expenses for installation of a second television channel (transmission) to the non-educational uses of the RTI (Ivorian Radio and Television). Given the conclusions implied by the present projections (i.e., the expenditures under all alternatives are enormous in relation to the country's resources), the systematic underestimation of those expenses does not present serious problems of interpretation.

Lastly, it should be pointed out that costs in this report are expressed in 1975 CFA F.

## B. Costs of the First Cycle of Secondary Education

### 1. Total First Cycle Enrollment Under Selected Alternatives

These enrollments are projected in Table 7 on the basis of different combinations of options from (a), (b), and (d) selected in the preceding chapter and described in Table 6A.

Enrollment projections (Table 7) lead us to the following conclusions:

- There is practically no difference among alternatives incorporating different controls of repetitions. The main impact of restricting repetitions is on enrollments in the CM2 class and in the complementary cycle (see Table A4).
- The "leanest" alternative (I) results in public school enrollments that are almost three times greater in 1990 than today. The most "liberal" alternative (IV) multiplies these enrollments by more than 5. The other alternatives entail a multiplying coefficient between 3 and 5, but on the average closer to 4.5.
- In passing it should be noted than an enrollment of 400,000 in the first cycle of secondary education (both public and private) represents about 7% of the total population, whereas in a country like France with, granted, a very different age distribution, the proportion is less than 5%. This is only meant to underline the considerable burden that educational expenses impose on the Ivory Coast and, more generally, on all countries with a young demographic structure, that is, developing countries.

### 2. Costs of the First Cycle

First cycle costs are computed for the 12 scenarios obtained by associating different technological options (option categories (f) and (g) with the sic enrollment projections identified earlier. These 12 alternatives are described in Chapter II, Section E, and summarized in Table 6B.

## Table 7: Projected Enrollments; First Cycle of Secondary Education

| Year | PRIVATE SECTOR (Projedor 9) | PUBLIC SECTOR | | | | | |
|---|---|---|---|---|---|---|---|
| | | ALT. I | ALT. II | ALT. III | ALT. IV | ALT. V | ALT. VI |
| 1975-76 | 28167 | 61887 | 61887 | 61887 | 61887 | 61887 | 61887 |
| 1976-77 | 31420 | 66216 | 66216 | 66216 | 66216 | 66216 | 66216 |
| 1977-78 | 35192 | 78009 | 82849 | 82849 | 82849 | 72770 | 72770 |
| 1978-79 | 39159 | 86975 | 97951 | 98960 | 98960 | 80264 | 82244 |
| 1979-80 | 42974 | 92996 | 110974 | 113916 | 113916 | 89050 | 92852 |
| 1980-81 | 46591 | 97006 | 122777 | 128478 | 129623 | 100888 | 107492 |
| 1981-82 | 49976 | 96484 | 134469 | 142965 | 149264 | 115422 | 125449 |
| 1982-83 | 52789 | 97070 | 150590 | 159497 | 172569 | 134948 | 144347 |
| 1983-84 | 55216 | 100076 | 171703 | 180050 | 200912 | 158362 | 167129 |
| 1984-85 | 56756 | 105961 | 195292 | 201671 | 230879 | 182802 | 189357 |
| 1985-86 | 57785 | 115790 | 220172 | 224460 | 257940 | 206211 | 210542 |
| 1986-87 | 57843 | 127278 | 243694 | 247281 | 284356 | 227450 | 231360 |
| 1987-88 | 57731 | 139982 | 265478 | 268697 | 308895 | 247667 | 251543 |
| 1988-89 | 57275 | 153224 | 287241 | 290689 | 333643 | 268419 | 272369 |
| 1989-90 | 57123 | 168145 | 310760 | 315121 | 360616 | 291102 | 295727 |
| 1990-91 | 56771 | 183674 | 339138 | 340612 | 389618 | 315081 | 319628 |

The computation consists continually in estimating individual unit costs, which are then multiplied by the relevant enrollments. The following 5 unit costs are required:

a) per student cost of traditional inscitutional education (present system)

b) per student cost of instiutional education (with media support)

c) per student cost of institutional education (media-based)

d) per student cost of community education

e) per student cost of extension of "distance" education.

Unit costs are estimated in succession for these 5 types of enrollments.

a) Cost of the traditional student

To compute this cost we will use Projedor data, after first simplifying them somewhat.

i) Cost of the teaching personnel

The most delicate point concerns the participation of French technical assistants, whose cost is considerably higher than that of their Ivorian counterparts. We will use the participation ratios projected by Projedor 9, since they are, in regard to enrollments, close to our average assumption.

Table 8: RATIOS OF FRENCH TECHNICAL ASSISTANTS AMONG THE TEACHING STAFF OF THE FIRST SECONDARY CYCLE

| YEAR | RATIO OF F.T.A. | YEAR | RATIO OF F.T.A. |
|---|---|---|---|
| 1976-77 | 40.0 % | 1984-85 | 18.6 % |
| 1977-78 | 38.6 % | 1985-86 | 15.0 % |
| 1978-79 | 37.1 % | 1986-87 | 13.2 % |
| 1979-80 | 35.4 % | 1987-88 | 11.3 % |
| 1980-81 | 33.3 % | 1988-89 | 9.5 % |
| 1981-82 | 29.6 % | 1989-90 | 7.7 % |
| 1982-83 | 26.0 % | 1990-91 | 5.6 % |
| 1983-84 | 22.3 % | | |

A decrease in FTA numbers will cause a progressive decrease in unit cost based on two assumptions: that the teacher/student ratio remains the same (one teacher per 30 students) and that teachers' real salaries remain constant, i.e., 2,500,000 CFA F on the average for an Ivorian and 4,000,000 CFA F for an FTA.

Thus, the annual per student cost is as follows:

$$AC_i = \frac{(2{,}500{,}000 \times (\%\ \text{Ivorians}) + (4{,}000{,}000 \times \%\ \text{FTA's}))}{30}$$

Table 9: UNIT COST OF TEACHERS

| $Year_i$ | $AC_i$ (CFA F)* | $Year_i$ | $AC_i$ (CFA F) |
|---|---|---|---|
| 1976-77 | 103 300 | 1984-85 | 92 600 |
| 1977-78 | 102 600 | 1985-86 | 90 800 |
| 1978-79 | 101 800 | 1986-87 | 89 900 |
| 1979-80 | 101 000 | 1987-88 | 89 000 |
| 1980-81 | 100 800 | 1988-89 | 88 100 |
| 1981-82 | 98 100 | 1989-90 | 87 200 |
| 1982-83 | 96 300 | 1990-91 | 86 100 |
| 1983-84 | 94 500 | | |

*All costs in this report are expressed in 1975 CFA F.

### ii) Facilities unit cost

The average cost of building and furnishing a classroom in the first cycle is slightly higher than 7,000,000 CFA F. Such a classroom accommodates an average of 46 students, so that the new facilities expenditure incurred by the addition of one student is 7,000,000/46, or 150,000 CFA F.

Given the low percentage of total expenditures going to this item, and the fairly regular growth of enrollments up to 1990, an approximate annual figure for the expenditure on new facilities is obtained based on a constant rate of increase (k) in enrollments. In that case, the annual expenditure is proportional to the enrollment, the multiplying factor being 150,000 x k.* Except under

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* The expenditure $D_t$ in the year t is equal to C x $DE_{t+1}$ where C represents the unit cost per student and $DE_{t+1}$ the enrollment increase between t and t+1. For an enrollment $E_t$, $DE_{t+1} = k E_t$. By substituting factors in the preceding equation, we obtain $D_t = (C \times k) E_t$.

Alternative I, the annual average increase in enrollments is about 11%, yielding a multiplying factor or "unit cost" of 16,500 CFA F.

Replacement costs are also computed on a unit basis. Assuming half the existing buildings and furniture in 1975-76 are replaced within the next fifteen years, the unit cost (except under Alternative I) is approximately 1,500 CFA F.

Thus, the total unit cost for facilities is 16,500 + 1,500 = 18,000 CFA F, except under Alternative I. In this latter case, the slower rate of increase in enrollments (8%) yields a lower unit cost of new construction (12 000 CFA F) and a higher unit cost of replacement (2,500 CFA F). A total unit cost of 18,000 CFA F is nevertheless used in all computations, leading to an overestimate under Alternative I.

iii) Other operating costs (scholarships, boarding, equipment)

According to Projedor 9, these costs average for the entire period 62,000 CFA F per student per year. We accept this projection.

iv) Summary unit cost of traditional education

According to the preceding computations, the total unit cost for facilities and other operating costs is 18,000 + 62,000 CFA F = 80,000 CFA F. This cost is reduced to 75,000 CFA F to account for economies of scale on several levels expected as a result of the system's rapid growth.

The aggregate of all unit costs previously reviewed is shown in Table 10 on the following page.

Table 10: PER STUDENT COST OF TRADITIONAL EDUCATION

| YEAR | TOTAL $AC_i$ | YEAR | TOTAL $AC_i$ |
|---|---|---|---|
| 1976-77 | 178 300 | 1984-85 | 167 600 |
| 1977-78 | 177 600 | 1985-86 | 165 000 |
| 1978-79 | 176 800 | 1986-87 | 164 900 |
| 1979-80 | 176 000 | 1987-88 | 164 000 |
| 1980-81 | 175 800 | 1988-89 | 163 100 |
| 1981-82 | 173 100 | 1989-90 | 162 200 |
| 1982-83 | 171 300 | 1990-91 | 161 100 |
| 1983-84 | 169 500 | | |

### b) Per student cost of media complemented (institutional) education

Under this alternative, the rationale for the use of the new media is to complement the teaching of newly trained and relatively inexperienced Ivorian teachers, especially in such areas as mathematics and modern languages, and to enrich the teaching of other subjects through short documentaries.

The analysis presented in Part I suggests the utilization of audio-visual materials under the teachers' direct responsibility, such materials being obtained either from the school's own audio-visual resource center, or from that of districts serving several schools. An adequate supply of projectors and recorders would be made available to each school. The use of the audio-visual resource center and the projectors/recorders would be put under the control of a teacher (small schools) or under a special administrator (large schools).

In the absence of adequate data, the costs computed for this section are those of television media support. Although this alternative considerably reduces the teachers' ability freely to use and control the audio-visual material, it has the advantage of being based on an experience already acquired by the Ivory Coast. Its costs, incidentally, are certain to be lower than those of a decentralized use of audiovisual materials, given the existence of a powerful infrastructure in the field of television. The support provided under this assumption would consist of fewer and slightly longer programs than in the primary cycle (twenty minutes). These programs would be accompanied by a printed text designed to complement them and facilitate their utilization.

Two types of expenditure must be incurred to reach this objective:

- For the reception of TV programs, a television receiver must be installed, maintained, and connected with mainline power in each classroom. Given i) the gradual introduction of this instrument in the system and ii) the very low corresponding expense (the investment cost for receivers is even lower), we adopt the unit cost figures computed for the primary school system by Eicher and Orivel, even though they represent an "economic" cost rather than an annual expenditure.

- For the production and distribution of support materials we only include additional costs for paper, based on 700 CFA F per student (present unit cost for the primary school system). Assuming that these support materials will be used by more than one student on the average, this cost is slightly overestimated. On the other hand, it is apparent that a higher financial effort is necessary for the efficient distribution of support materials to the students.

We consider that all other costs, i.e., those of the production and transmission of TV programs, and the production and printing of support materials, are already accounted for under the PETV's operating costs. This program, central to the reform of the Ivorian primary education, includes a TV program production and transmission unit and a printed support material production and printing unit. Within the scope of their evaluation, J. C. Eicher and F. Orivel evaluated total past, present, and future costs of these production units* and showed that they largely operate below capacity (between 20 and 50%); this observation has also been made by DOGE experts and by a recent UNESCO mission (Brunswic, 1977).

It is well known that in this type of operation, efficiency requires a commitment to substantial fixed costs and may entail production below capacity. While the primary school system cost study had to allocate all of these costs to primary education, the introduction of a secondary user requires that fixed costs be newly imputed. From the standpoint of project expenditures, however, using part of these instruments for media production in the first cycle of secondary school only entails marginal outlays related to variable inputs. Consequently, the costs (expenditures) shown in Table 11 are limited to the two items (reception,paper) analyzed above.

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*Eicher, Jean-Claude and Orivel, Francois. "Cost Analysis of Primary Education in the Ivory Coast.". Abidjan: Evaluation Service, 1977.

The introduction of new media does not change the structure of other costs, particularly those of teachers. Thus, the media cost per student is added to the unit cost of traditional education. Actually, it does not significantly affect the latter figure which, as we have already seen, is approximately 170,000 CFA F.

Table 11: NEW MEDIA PER STUDENT COSTS FROM 1977 TO 1990

Unit : CFA F 1975

| YEAR | TV RECEPTION [1] | PAPER | TOTAL |
|---|---|---|---|
| 1977-78 | 2640 | 700 | 3340 |
| 1978-79 | 3170 | 700 | 3870 |
| 1979-80 | 2680 | 700 | 3380 |
| 1980-81 | 3320 | 700 | 4020 |
| 1981-82 | 2650 | 700 | 3350 |
| 1982-83 | 1500 | 700 | 2200 |
| 1983-84 | 1460 | 700 | 2160 |
| 1984-85 | 1410 | 700 | 2110 |
| 1985-86 | 1460 | 700 | 2160 |
| 1986-87 | 1460 | 700 | 2160 |
| 1987-88 | 1460 | 700 | 2160 |
| 1988-89 | 1310 | 700 | 2010 |
| 1989-90 | 1220 | 700 | 1920 |
| 1990-91 | 1310 | 700 | 2010 |

[1] This cost is reproduced from the Eicher-Orivel report on the PETV. (Table 15, p.35.) The decrease is explained by lowered electricity and maintenance costs.

Table 12: TOTAL PER STUDENT COST OF INSTITUTIONAL EDUCATION WITH MEDIA SUPPORT

| YEAR | PER STUDENT COST | YEAR | PER STUDENT COST |
|---|---|---|---|
| 1977-78 | 180 940 | 1984-85 | 1969 710 |
| 1978-79 | 180 670 | 1985-86 | 167 960 |
| 1979-80 | 179 380 | 1986-87 | 167 060 |
| 1980-81 | 179 820 | 1987-88 | 166 160 |
| 1981-82 | 176 450 | 1988-89 | 165 110 |
| 1982-83 | 173 500 | 1989-90 | 164 120 |
| 1983-84 | 171 660 | 1990-91 | 163 110 |

### c) Per student cost of media-based (institutional) education

The assumption of no change in the teaching staff structure crumbles with the massive introduction of new media. The powerful educational assistance these media can provide would allow various reductions in personnel costs, either through substitution of primary school teachers (somewhat as in the Brazilian state of Marahao), or through reduction of the student/teacher ratio, or through the combination of a very small number of secondary school teachers with monitors trained at the primary school level. The assumption made in these computations is that of one primary school teacher per 46 students, paid at the primary school teacher salary.

On the other hand, the additional costs represented by the new media would be higher.

### i) Teacher costs

Starting from the premise of one Ivorian primary school teacher for every 46 students, the unit cost will slightly increase as a result of the seniority acquired by teachers, who will become slightly older, on the average, during the course of the next fifteen years.

The annual profile of average per student costs in that projected by Projedor 9 for public primary education.

Table 13: PER STUDENT TEACHER COST OF MEDIA-BASED EDUCATION

| YEAR | PER STUDENT COST | YEAR | PER STUDENT COST |
|---|---|---|---|
| 1977-78 | 30 370 | 1984-85 | 38 600 |
| 1978-79 | 31 630 | 1985-86 | 39 810 |
| 1979-80 | 32 800 | 1986-87 | 41 050 |
| 1980-81 | 33 950 | 1987-88 | 42 320 |
| 1981-82 | 35 240 | 1988-89 | 43 600 |
| 1982-83 | 36 210 | 1989-90 | 44 910 |
| 1983-84 | 37 390 | 1990-91 | 45 800 |

### ii) Media costs

In spite of existing available air time, the introduction of many TV programs would require the installation of a second television channel. Since for the moment we are only considering program transmissions for the first cycle, consisting of four grades, daily programs could be spread out over six school hours and reach each classroom for a minimum of 80 minutes. The distribution of program time among periods may vary with, for example, two 25-minute and two 15-minute programs transmitted in four different periods.

The installation of a second channel has been sought independently by RTI, which would thus enjoy more flexibility and have an additional outlet for evening viewing. One could therefore, envisage, as in the case of the first channel, a sharing of financial responsibility. The fee charged by RTI for maintenance of the first channel is 162 million CFA F per year, with no imputation for the cost of amortization. It is difficult to estimate the cost of the new installation, which in any case should not be more than that of the first channel. At any rate, this cost is entirely imputed to RTI's general activities, and an annual maintenance fee of 200 million CFA F is charged to the budget of the secondary education system.

As in the preceding case, the program production capacity of the ETV Complex would not need bolstering. This statement may cause surprise, but one must not forget that the PETV was designed is to modify current norms of technical quality toward a reduced significant number or remakes, assuming a massive use of the television medium. Moreover, it has been observed by evaluation teams that production flexibility is generally very great. In fact, all that is necessary to increase the number of programs produced,

level of sophistication; no serious empirical study has shown that this would have a qualitative impact on the education provided.

As a result, this alternative does not increase variable production costs of TV programs. It would nevertheless be desirable to increase the quantity of support materials and the reach of the distribution system. To that end, we project a tripling of the resources budgeted for primary education, raising the amount to 2,000 CFA F per student per year.

### iii) Other costs and total per student costs

Other costs (scholarships, boarding, various materials, classroom construction) do not vary with respect to the preceding alternatives, their total being 75,000 CFA F per student. Setting aside the fixed annual expense of 200 million CFA F for network maintenance, the total unit cost under this option will increase as follows:

Table 14: TOTAL PER STUDENT COST OF MEDIA-BASED (INSTITUTIONAL) EDUCATION

| YEAR | TOTAL PER STUDENT COST | YEAR | TOTAL PER STUDENT COST |
|---|---|---|---|
| 1977-78 | 107 370 | 1984-85 | 115 600 |
| 1978-79 | 108 370 | 1985-86 | 116 810 |
| 1979-80 | 109 800 | 1986-87 | 118 050 |
| 1980-81 | 110 950 | 1987-88 | 119 320 |
| 1981-82 | 112 240 | 1988-89 | 120 600 |
| 1982-83 | 113 210 | 1989-90 | 121 910 |
| 1983-84 | 114 390 | 1990-91 | 122 800 |

Note: Total cost is the sum of teachers cost (Table 12), classroom facilities and miscellaneous (75,000) and paper (2,000). We have not included the fixed additional cost of 200 million for network maintenance.

### d) Per student cost of community education

The community education system is based on the Mexican model, intended to provide education to rural areas where it would have been impossible to build secondary schools. The system relies on distance media (television, printed support materials) but instead of building traditional schools, available "make-shift" means are used as much as possible (existing buildings) and villagers are expected to participate actively.

In the case of the Ivory Coast a partial adoption of this system in some rural areas would involve lower-cost resources than the preceding model, i.e., a primary school teacher supported by substantial audio-visual means, and a makeshift school run by the villagers that would save the cost of building a traditional school. Associated costs (scholarships, boarding, materials, and various operating costs) would also be considerably lower as a result of village solidarity and could be reduced by 75%, that is, to 15,000 CFA F.

In the absence of a massive introduction of new media in institutional education, community education on the suggested model would independently require the establishment of a second television channel. Again, the installation expense is affected in its entirety to RTI's general use. Since in the alternatives considered community education is never associated with media-based institutional education, the annual network maintenance fee is charged entirely to the budget of community education.

Apart from the fixed annual network maintenance fee (200 million CFA F), the unit cost of such alternative would include that of the television medium shown in Table 11, 2,000 CFA F for paper, and the teaching costs in Table 12, yielding the following total:

Table 15: COMMUNITY EDUCATION PER STUDENT COST

| YEAR | PER STUDENT COST | YEAR | PER STUDENT COST |
|---|---|---|---|
| 1977-78 | 50 010 | 1984-85 | 57 010 |
| 1978-79 | 51 800 | 1985-86 | 58 270 |
| 1979-80 | 52 480 | 1986-87 | 59 510 |
| 1980-81 | 54 270 | 1987-88 | 60 780 |
| 1981-82 | 54 890 | 1988-89 | 61 910 |
| 1982-83 | 54 710 | 1989-90 | 63 130 |
| 1983-84 | 55 850 | 1990-91 | 64 110 |

It will be noted that this alternative which replaces secondary school teachers (French and Ivorian) with Ivorian primary school teachers supported by media, and which relies on the concept of village solidarity, will reduce per student costs to a third of what they are in the traditional secondary school system.

e) Per student cost of distance education

The problem of distance education in a country such as the Ivory Coast is mainly that of the post office, which is not as regular, reliable and extensive as in the more developed countries.

That is why, in all their alternatives under review, distance education is envisaged only as a marginal component designed for the relatively few individuals who cannot attend regular classes.

Television program scheduling makes it practically impossible to use this medium on a large scale outside school hours. One could however envisage three daily programs (in the morning before school, at noon during lunchtime, and in the evening, just after school and before the evening entertainment and news programs.) Likewise, Saturday morning could be devoted to a few programs.

Radio could also provide a more substantial time slot between 6 p.m. and 8:30 p.m. Indeed it would be desirable to rely more on radio than on television, since the requirement of a television set at home in the latter case automatically excludes a great number of potential users. The ETV Complex could be the production unit for these radio-television programs, as well as for printed support materials.

However, a central unit should be created consisting of teachers and curriculum specialists to organize and operate correspondence courses, including the dispatch and correction of homework.

In this case we assume a ratio of one teacher per 92 students, that is twice the usual ratio. A team of five upper-level curriculum specialists, paid at the same rate as French technical assistants, would represent the fixed cost of this system, or 20 million CFA F per year.

Additional expenditures on audio-visual personnel and equipment will again be neglected, assuming unusual capacities at the ETV Complex. The volume of materials issued by the Complex will fall between the volumes projected under options (b) and (c), giving an approximate cost of 1,000 F per student.

Materials issued from the central education unit will be sent weekly, implying some 35 mailings per year both ways. If one such exchange costs 400 CFA F (including postage), the cost of this activity comes to 14,000 CFA F per student per year. Adding the cost of the primary school teachers team, or half the figure shown in Table 12, the per student cost of the entire system will be as follows:

Table 16: TOTAL PER STUDENT COSTS OF DISTANCE EDUCATION

| YEAR | TOTAL PER STUDENT COST | YEAR | TOTAL PER STUDENT COST |
|---|---|---|---|
| 1977-78 | 30 190 | 1984-85 | 34 300 |
| 1978-79 | 30 820 | 1985-86 | 34 900 |
| 1979-80 | 31 400 | 1986-87 | 35 530 |
| 1980-81 | 31 980 | 1987-88 | 36 160 |
| 1981-82 | 32 620 | 1988-89 | 36 800 |
| 1982-83 | 33 100 | 1989-90 | 37 460 |
| 1983-84 | 33 700 | 1990-91 | 37 900 |

## 3. Conclusion on the cost of reviewed alternatives.

Table 17 summarizes for the next fourteen years the cost of the various alternatives reviewed with respect to the first cycle of secondary education. Based on their total cost in the final year of the projection (1990), these alternatives can be classified into two groups: those with significant and those with minor budgetary impact.

## Table 17: SUMMARY OF TOTAL COST UNDER THE TWELVE ALTERNATIVES REVIEWED: FIRST CYCLE OF SECONDARY EDUCATION

| YEAR | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [9] | [10] | [11] | [12] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1977-78 | 13854 | 14714 | 14714 | 14714 | 12924 | 13167 | 13167 | 8013 | 11267 | 11267 | 9246 | 9412 |
| 1978-79 | 15377 | 17318 | 17496 | 17496 | 14191 | 14502 | 14959 | 8998 | 12394 | 12632 | 10208 | 10395 |
| 1979-80 | 16367 | 19531 | 20049 | 20049 | 15673 | 15974 | 16656 | 9978 | 13693 | 13914 | 11286 | 11466 |
| 1980-81 | 17054 | 21584 | 22586 | 22788 | 17736 | 18142 | 19329 | 11394 | 15484 | 15808 | 12808 | 13051 |
| 1981-82 | 16701 | 25796 | 27322 | 25838 | 19980 | 20367 | 22135 | 13155 | 17451 | 17760 | 14466 | 14698 |
| 1982-83 | 16628 | 25796 | 27322 | 29561 | 23117 | 23414 | 25044 | 15477 | 20170 | 20408 | 16732 | 16909 |
| 1983-84 | 16963 | 29104 | 30518 | 34055 | 26842 | 27184 | 28689 | 18315 | 23443 | 23717 | 19492 | 19698 |
| 1984-85 | 17759 | 32731 | 33800 | 38695 | 30638 | 31024 | 32136 | 21332 | 26794 | 27103 | 22336 | 22567 |
| 1985-86 | 19198 | 36505 | 37215 | 42766 | 34190 | 34635 | 35363 | 24288 | 29955 | 30311 | 25039 | 25306 |
| 1986-87 | 20988 | 40185 | 40777 | 46890 | 37507 | 37998 | 38998 | 27050 | 32912 | 33305 | 27573 | 27978 |
| 1987-88 | 22957 | 43538 | 44066 | 50659 | 40617 | 41152 | 41796 | 29752 | 35705 | 36133 | 29982 | 30303 |
| 1988-89 | 24991 | 46859 | 47411 | 54417 | 43779 | 44319 | 44971 | 32571 | 38546 | 38979 | 32440 | 32764 |
| 1989-90 | 26462 | 50405 | 51113 | 58492 | 47217 | 47776 | 48535 | 35688 | 41648 | 42096 | 35134 | 35468 |
| 1990-91 | 29590 | 54635 | 54873 | 62767 | 50760 | 51393 | 52135 | 38892 | 44848 | 45354 | 37910 | 38290 |

The rise in expenditures between the least (1) and most (4) costly alternative exceeds 100% (29.6 billion versus 62.8).

The difference in this particular case is explained by the size of enrollments, which doubles between (1) and (4). These enrollments depend on three variables:

- rate of access
- control of repetitions
- efficiency of student flow through the cycle

We have already seen that the control of repetitions has little impact on enrollments in the first secondary cycle ( as opposed to enrollments in the CM2 class). The rate of access into sixième is clearly the major determinant. However, the impact of the selected student flow is far from negligible, since with the same rate of access, shifting from flow diagram 1 to 3 cuts enrollment growth by a good third.

Technological options (educational setting and specific technology) represent the second important cause of cost variations. The traditional education system is the most costly, especially when marginally supported by media. On the other hand, a media-based technology reduces costs considerably (about 30%).

The explanation is the following: a high level of media assistance makes it possible to replace present secondary school teachers with Ivorian primary school teachers. This substitution generates two savings:

- One-subject secondary school teachers are replaced by "polyvalent" teachers, thus cutting the teacher-student ratio from 1:30 to 1:46.

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- Present secondary school teachers cost 4 million a year if they are French (which is still generally the case) and 2.5 million if they are Ivorian. These costs, incidentally, are exhorbitant for a country in the early stages of development, since they are rather higher than those incurred by developed countries. The replacement of secondary school personnel by Ivorian primary school teachers, who are themselves relatively well paid, cuts the average salary by half.

An objection to this substitution is that secondary school teachers are employed at this time and cannot be dismissed en masse. Such an objection is easily disposed of. Numerous countries and especially France have a two-tiered teaching staff in the first cycle of secondary education: a minority that holds secondary school teaching credentials and a majority of primary school teachers. The two bodies coexist quite successfully and there is no reason why the Ivory Coast should give up this alternative.

Such are therefore the two key variables that explain the variability of total costs under different alternatives: enrollments and status of teaching staff.

## C. Costs of the Complementary Cycle

### 1. Enrollments in the complementary cycle under selected alternatives

Enrollment projections for the complementary cycle are given in Table A4, and summarized in Table 18 under the various alternatives defined in Chapter II, Section D, and described in Table A6.

## Table 18: SUMMARY OF ENROLLMENT PROJECTIONS IN THE COMPLEMENTARY CYCLE -- SECOND MODEL

|  | Alternative I<br>Rate of access to 6e: 30%<br>Control of repetitions*: tight |  |  | Alternative II<br>Rate of access to 6e: 44%<br>Control of repetitions*: loose |  |  |
|---|---|---|---|---|---|---|
| Year | Transit | Termin. | Total | Transit | Termin. | Total |
| 1977-78 | 38 400 | 2 200 | 40 600 | 38 400 | 2 200 | 40 600 |
| 1978-79 | 52 000 | 11 500 | 63 500 | 55 300 | 10 200 | 65 500 |
| 1979-80 | 48 300 | 31 500 | 79 800 | 59 800 | 25 900 | 85 700 |
| 1980-81 | 45 600 | 47 700 | 93 300 | 66 700 | 34 900 | 101 600 |
| 1981-82 | 39 600 | 71 200 | 110 800 | 73 100 | 45 700 | 118 800 |
| 1982-83 | 41 600 | 99 800 | 141 400 | 85 600 | 59 600 | 145 200 |
| 1983-84 | 47 000 | 129 200 | 176 200 | 97 900 | 76 100 | 174 000 |
| 1984-85 | 51 000 | 162 400 | 213 400 | 107 500 | 96 800 | 204 300 |
| 1985-86 | 54 800 | 194 400 | 249 200 | 115 900 | 116 600 | 232 500 |
| 1986-87 | 59 100 | 206 500 | 265 600 | 124 800 | 123 800 | 248 600 |
| 1987-88 | 64 300 | 220 100 | 284 400 | 135 400 | 131 700 | 267 100 |
| 1988-89 | 68 600 | 235 100 | 303 700 | 145 400 | 140 400 | 285 800 |
| 1989-90 | 75 000 | 251 800 | 326 800 | 157 900 | 150 800 | 308 700 |
| 1990-91 | 79 000 | 268 500 | 347 500 | 167 800 | 161 000 | 328 800 |

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* Repetitions of preparation for sixième entrance examination

## Table 18 - Continued

| | Alternative III<br>Rate of access to 6e: 44%<br>Control of repetitions*: tight | | | Alternatives IV & V<br>Rate of access to 6e: 50%<br>Control of repetitions*: loose | | | Alternative VI<br>Rate of access to 6e: 50%<br>Control of repetitions*: tight | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Transit | Termin. | Total | Transit | Termin. | Total | Transit | Termin. | Total |
| 1977-78 | 38 400 | 2 200 | 40 600 | 38 400 | 2 200 | 40 600 | 38 400 | 2 200 | 40 600 |
| 1978-79 | 51 400 | 11 200 | 62 600 | 54 700 | 10 200 | 64 900 | 50 700 | 11 200 | 61 900 |
| 1979-80 | 48 900 | 29 400 | 78 300 | 58 400 | 25 500 | 83 900 | 47 500 | 29 000 | 76 500 |
| 1980-81 | 47 400 | 43 200 | 90 600 | 64 400 | 33 600 | 98 000 | 45 000 | 42 300 | 87 300 |
| 1981-82 | 43 500 | 60 300 | 103 800 | 68 900 | 43 000 | 111 900 | 39 800 | 56 900 | 96 700 |
| 1982-83 | 48 100 | 80 200 | 128 300 | 80 600 | 55 100 | 135 700 | 43 900 | 73 900 | 117 800 |
| 1983-84 | 55 000 | 101 800 | 156 800 | 93 300 | 69 400 | 162 700 | 50 300 | 92 000 | 142 300 |
| 1984-85 | 60 200 | 127 800 | 188 000 | 101 200 | 88 400 | 189 600 | 55 100 | 115 400 | 170 500 |
| 1985-86 | 65 000 | 152 700 | 217 700 | 109 000 | 106 300 | 215 300 | 59 400 | 138 100 | 197 500 |
| 1986-87 | 69 900 | 162 300 | 232 200 | 117 300 | 112 900 | 230 200 | 64 000 | 146 600 | 210 600 |
| 1987-88 | 75 900 | 173 100 | 249 000 | 127 300 | 120 200 | 247 500 | 69 500 | 156 400 | 225 900 |
| 1988-89 | 81 400 | 184 800 | 266 200 | 136 800 | 128 400 | 265 200 | 74 400 | 166 900 | 241 300 |
| 1989-90 | 88 400 | 198 400 | 286 800 | 148 700 | 137 400 | 286 100 | 81 000 | 179 000 | 260 000 |
| 1990-91 | 94 100 | 210 900 | 305 000 | 157 900 | 146 700 | 304 600 | 86 100 | 190 700 | 276 800 |

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* Repetitions of preparation for sixième entrance examination

The only pedagogical alternative selected with respect to complementary education is that of the second model. This model was introduced in Part I, Chapter IV, and its technology was described in Part II, Chapter I. It allows students to design the curriculum best suited to their needs, and incorporates students repeating their preparation for the sixième entrance examination. This model has many educational advantages over the other alternative and is also less costly since it can be implemented on an efficient scale in a greater number of villages.

Enrollments are divided into two groups: a) students whose objective is to enter sixième, described here as "transit" students and b) students preparing to enter the labor market, described as "terminal" students. This distinction is important since on the one hand, the enrollment of "terminal" students is the only one attributable to the existence of the complementary cycle (in its absence students who failed the sixième entrance examination would remain in CM2); and, on the other hand, teaching costs vary considerably between the two groups.

Total enrollment is rather insensitive to policy changes represented by the different scenarios, since reductions in the number of "transit" students are offset by increases in the number of "terminal" students. Total enrollment varies from 40,600 in 1977-78 (mainly consisting of transit students) to a figure somewhere between 300,000 and 350,000 in 1990-91. On the other hand, the relative growth in the two types of students is strongly influenced by the policy adopted: terminal student enrollment for 1990-91 only reaches 150,000 under Alternatives

IV and V (high rate of access to sixième and loose control of repetitions) but rises to 270,000 under Alternative I (low rate of access and tight control of repetitions); the growth of transit student enrollments varies inversely with the same amplitude.

It should also be noted that the eventual enrollment of terminal student in the complementary cycle is of the same order as enrollment in the first cycle (minimum: 183,674; maximum: 389,618), but varies inversely as a function of the alternatives considered.

It may appear artificial to specify student enrollments for the year 1977-78 given the date this report was prepared (September 1977). It should, however, be noted that initial enrollments consist primarily of transit students who, instead of being counted as CM2 students, may be immediately classified as belonging to the complementary cycle. In the absence of the 2,200 terminal students projected for 1977-78, their cost may be ascribed to the development of the complementary cycle during that year. At any rate, initial investment expenditures related to the education of terminal students are computed on the basis of a 1978-79 starting date, with the enrollment projected for this second year.

### 2. Cost components of the complementary cycle

Annual expenses for the complementary cycle are projected to the year 1990-91 in three stages: 1) computation of costs proportional to enrollment (mainly operating expenses), 2) computation of costs related to the growth of enrollments (investment expenditures) and 3) computation of total and net costs. The net annual cost of the complementary cycle is obtained by subtracting the alternative cost of transit students, were repetitions transferred back to the CM2 class.

a) Costs proportional to enrollment

These costs are regrouped under five categories:

i) Teacher costs, regular staff

At the projected level the regular teaching staff will consist of primary school teachers, some of whom will have acquired specialized training in vocational education. Per student cost is the same as in Table 13 above.

ii) Cost of school materials and supplies

This cost is projected at 5,000 CFA F per student per year.

iii) Cost of television support

The cost of television support is expressed as a multiple of total enrollment, based on the rationale developed in computing the costs of secondary education with some media support. Unit costs are those shown in Table 11 above.

iv) Cost of supplies, operation and maintance of equipment in vocational education

This cost is projected separately for students preparing the sixième entrance examination and for terminal students. For the latter it is set at 5,000 CFA F per student per year.* Assuming that the participation of transit students in vocational education courses will be one fourth that of terminal students, the cost figure adopted for the former is only 1,250 CFA F.

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*At least in the case of agricultural training, part of the costs will be defrayed by the sale of products generated in the course of vocational training.

v) Cost of training specialists in vocational education

These training specialists are assigned to the mobile units described in Chapter II, or to fixed facilities in the case of large institutions. The computations below suggest the use of one specialist per 150 terminal students. Based on an annual salary of 600,000 CFA F, the cost per terminal student is therefore 600,000/150 = 4,000 CFA F.

Costs proportional to enrollment are summarized in Table 19 for the two categories of students.

Table 19: PER STUDENT COSTS IN THE COMPLEMENTARY CYCLE (COSTS PROPORTIONAL TO ENROLLMENT)

| Year | Per student cost |  | Year | Per student cost |  |
|---|---|---|---|---|---|
|  | Transit | Terminal |  | Transit | Terminal |
| 1977-78 | 39 960 | 47 710 | 1984-85 | 46 960 | 54 710 |
| 1978-79 | 41 750 | 49 500 | 1985-86 | 48 220 | 55 970 |
| 1979-80 | 42 430 | 50 180 | 1986-87 | 49 460 | 57 210 |
| 1980-81 | 43 580 | 51 330 | 1987-88 | 50 730 | 58 480 |
| 1981-82 | 44 840 | 52 590 | 1988-89 | 51 860 | 59 610 |
| 1982-83 | 44 660 | 52 410 | 1989-90 | 53 080 | 60 830 |
| 1983-84 | 45 800 | 53 550 | 1990-91 | 54 060 | 61 810 |

b) Costs related to enrollment growth

These costs are those of classroom and workshop construction, and, of vocational training equipment.*

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* It is assumed that the agricultural land needed for vocational training will be made available free to the schools by the communities involved.

### i) Construction and furnishing of classrooms and workshops

We assume one classroom per 45 students of any category and one workshop per 45 terminal students. This latter figure is based on an average use of the workshop equal to 36 hours per week, and an occupancy of 8 hours per week per student in groups of ten.

After 1985, the ratio of transit students to terminal students varies between 1:3 and 1:1 according to the alternative selected. The occupancy of workshops by transit students, being one fourth that of terminal students, can therefore be accomodated within the normal stretch of the projected capacity. The proportion of transit students will be higher at the start, decreasing progressively to its stationary level between 1978 and 1985. On the other hand, one must realize that at first the participation of transit students in vocational courses will at first be insignificant, reaching its anticipated rate progressively during the course of the same period.

The average cost of building and furnishing a primary school classroom is estimated at 3.4 million CFA F. The same cost will be adopted for a workshop (with work-benches). The annual cost of new construction is therefore obtained through multiplication of the increase in transit enrollment by $\frac{3.4 \text{ million}}{45} = 75{,}000$ CFA F, and, of the increase in terminal enrollment by 150,000 CFA F. Replacement costs which, for the period considered, apply only to CM2 classes freed by transit students and transferred to the complementary cycle, are not taken into account.

ii) Costs of vocational training equipment

This cost is computed strictly by reference to the growth of terminal student enrollments since the participation of transit students will not be substantial.

The need for simple manual tools is estimated at 4,000 CFA F per student, and that of mechanical equipment, in fixed or mobile units, at 30,000 CFA F. This latter figure is based on an effective utilization of each unit equal to 1,400 hours per year. Assuming that each terminal student will have access to 3 such units per year, working 30 hours at each unit in groups of 10, the number of necessary units is $\frac{3 \times 30/10}{10} = 1$ per 150 students. The average cost of a single unit is estimated at 4.5 million CFA F*; the investment per student is thus 4.5 million/150 = 30,000 CFA F.

Replacement costs for both types of equipment are based on an average utilization of five years, a fourth of the purchase price being recovered upon resale.

c) Total and net costs

Total costs are computed in Table 20 for each of the six enrollment profiles described in Table 18. Table 20 also yields the alternative cost of transit students under the assumption of their being held in the CM2 class. The difference between the total cost and this alternative cost is the net cost of the complementary cycle, since transit students would be found in the CM2 in its absence. Table A6 gives a more detailed analysis of total costs.

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*The cost will be less for fixed units and considerably higher for mobile ones, since the latter include vehicle and generator.

## Table 20: SUMMARY OF TOTAL AND NET COSTS OF THE COMPLEMENTARY CYCLE UNDER SIX ALTERNATIVES

**Second Model** | **Unit : million of CFA Francs**

| | Alternative I<br>Rate of access to 6e: 30%<br>Control of repetitions*: tight | | | Alternative II<br>Rate of access to 6e: 44%<br>Control of repetitions*: loose | | |
|---|---|---|---|---|---|---|
| Year | Total Cost | CM2 altern. cost | Net Cost | Total Cost | CM2 altern. Cost | Net Cost |
| 1977-78 | 4 774 | 2 554 | 2 220 | 4 783 | 2 802 | 1 981 |
| 1978-79 | 6 420 | 2 171 | 4 249 | 6 040 | 2 646 | 3 394 |
| 1979-80 | 6 611 | 2 049 | 4 562 | 6 011 | 3 055 | 2 956 |
| 1980-81 | 8 759 | 1 987 | 6 772 | 7 165 | 3 387 | 3 778 |
| 1981-82 | 10 782 | 1 776 | 9 006 | 9 176 | 4 215 | 4 961 |
| 1982-83 | 12 792 | 1 858 | 10 934 | 10 966 | 4 746 | 6 420 |
| 1983-84 | 15 691 | 2 153 | 13 538 | 13 488 | 5 204 | 8 284 |
| 1984-85 | 17 791 | 2 605 | 15 186 | 14 847 | 5 678 | 9 169 |
| 1985-86 | 16 671 | 2 965 | 13 706 | 14 383 | 6 257 | 8 126 |
| 1986-87 | 18 358 | 3 313 | 15 045 | 15.860 | 6 968 | 8 892 |
| 1987-88 | 20 258 | 3 584 | 16 674 | 17 603 | 7 619 | 9 984 |
| 1988-89 | 22 482 | 4 038 | 18 444 | 19 688 | 8 477 | 11 211 |
| 1989-90 | 23 900 | 4 281 | 19 619 | 21 435 | 9 650 | 11 785 |
| 1990-91 | 25 147 | 4 571 | 20 576 | 22 101 | 9 814 | 12 287 |

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* Repetitions of preparation for sixième entrance examination

## Table 20 - Continued

|  | Alternative III<br>Rate of access to 6e: 44%<br>Control of repetitions*: tight |  |  | Alternatives IV & V<br>Rate of access to 6e: 50%<br>Control of repetitions*: loose |  |  | Alternative VI<br>Rate of access to 6e: 50%<br>Control of repetitions*: tight |  |  |
|---|---|---|---|---|---|---|---|---|---|
| Year | Total Cost | CM2 altern. cost | Net Cost | Total Cost | CM2 altern. cost | Net Cost | Total Cost | CM2 altern. Cost | Net Cost |
| 1977-78 | 4 674 | 2 509 | 2 165 | 4 738 | 2 757 | 1 981 | 4 621 | 2 456 | 2 165 |
| 1978-79 | 6 049 | 2 146 | 3 903 | 5 881 | 2 561 | 3 320 | 5 946 | 2 117 | 3 829 |
| 1979-80 | 6 089 | 2 075 | 4 014 | 5 698 | 2 928 | 2 770 | 5 917 | 2 015 | 3 902 |
| 1980-81 | 7 429 | 2 066 | 5 363 | 6 600 | 3 145 | 3 455 | 6 818 | 1 961 | 4 857 |
| 1981-82 | 8 784 | 1 951 | 6 833 | 8 418 | 3 966 | 4 452 | 7 905 | 1 785 | 6 120 |
| 1982-83 | 10 881 | 2 418 | 8 463 | 10 332 | 4 553 | 5 779 | 9 450 | 1 961 | 7 489 |
| 1983-84 | 13 608 | 2 909 | 10 699 | 12 467 | 4 865 | 7 602 | 12 321 | 2 634 | 9 687 |
| 1984-85 | 15 113 | 3 187 | 11 926 | 13 673 | 5 337 | 8 336 | 13 740 | 2 910 | 10 830 |
| 1985-86 | 14 251 | 3 502 | 10 749 | 13 290 | 5 879 | 7 411 | 12 874 | 3 209 | 9 665 |
| 1986-87 | 15 687 | 3 907 | 11 780 | 14 662 | 6 552 | 8 110 | 14 201 | 3 577 | 10 624 |
| 1987-88 | 17 374 | 4 262 | 13 112 | 16 333 | 7 170 | 9 163 | 15 719 | 3 894 | 11 825 |
| 1988-89 | 19 391 | 4 746 | 14 645 | 18 172 | 7 987 | 10 185 | 17 400 | 4 353 | 13 047 |
| 1989-90 | 20 476 | 5 120 | 15 356 | 19 415 | 8 683 | 10 732 | 18 641 | 4 681 | 13 960 |
| 1990-91 | 21 532 | 5 515 | 16 017 | 20 418 | 9 226 | 11 192 | 19 566 | 5 037 | 14 529 |

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* Repetitions of preparation for sixieme entrance examination

As in the case of student enrollments, total costs are relatively unaffected by policy changes: at the end of the period (1990-91), they vary between 20 billion CFA F under Alternatives IV, V, and VI, (high rate of access to sixième) and 25 billion under Alternative I (low rate of access). The net cost, on the other hand, jumps from 11 billion under Alternatives IV and V to 20 billion under Alternative I; the ratio being approximately the same as the corresponding ratio of terminal student enrollments (145,000 and 270,000).

Alternatives IV and V are part of scenarios (4) and (6) and (8) to (12) considered in the cost analysis of the first secondary cycle (Tables 6B and 17). The first cycle enrollment in all cases (except (4)) is 315,000, a little more than twice the enrollment of terminal students in the complementary cycle, and its cost varies between 50 billion (traditional technology) and 40 billion (new technologies), which is four times the net cost of the complementary cycle. Approximately then, the eventual cost per terminal student in the complementary cycle is less than half the cost per student in secondary education.

Alternative I, on the other hand, is part of scenario (1) considered in the framework of secondary education. In the year 1990-91, first cycle enrollment under this alternative will be 185,000, or 2/3 the enrollment of terminal students in the complementary cycle, and its cost will reach 30 billion CFA F, surpassing by half the net cost of the complementray cycle. Once again, the eventual cost per terminal student is less than half the per student cost in the first cycle of secondary education.

Table 21: GENERAL COST SUMMARY FOR THE FOUR REFERENCE YEARS: 1977, 1980, 1985, 1990

Unit : Billion of CFA F.

| Year | | Alternatives* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [9] | [10] | [11] | [12] |
| 1977-78 | 1st cycle of secondary educ. | 13.8 | 14.7 | 14.7 | 14.7 | 12.9 | 13.2 | 13.2 | 8.0 | 11.3 | 11.3 | 9.2 | 9.4 |
| | Complementary cycle ** | | | | | | | | | | | | |
| | Total | | | | | | | | | | | | |
| 1980-81 | 1st cycle of secondary educ. | 17.1 | 21.6 | 22.6 | 22.8 | 17.7 | 18.1 | 19.3 | 11.4 | 15.5 | 15.8 | 12.8 | 13.1 |
| | Complementary cycle ** | 6.8 | 3.8 | 5.4 | 3.5 | 3.5 | 3.5 | 4.9 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| | Total | 23.9 | 25.4 | 28.0 | 26.3 | 21.2 | 21.6 | 24.2 | 14.9 | 19.0 | 19.3 | 16.3 | 16.6 |
| 1985-86 | 1st cycle of secondary educ. | 19.2 | 36.5 | 37.2 | 42.8 | 34.2 | 34.6 | 35.4 | 24.3 | 30.0 | 30.3 | 25.0 | 25.3 |
| | Complementary cycle** | 13.7 | 8,1 | 10.7 | 7.4 | 7.4 | 7.4 | 9.7 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 |
| | Total | 32.9 | 44.6 | 47.9 | 50.2 | 41.6 | 42.0 | 45.1 | 31.7 | 37.4 | 37.7 | 32.4 | 32.7 |
| 1990-91 | 1st cycle of secondary educ. | 29.6 | 54.6 | 54.9 | 62.8 | 50.8 | 51.4 | 52.1 | 38.9 | 44.8 | 45.4 | 37.9 | 38.3 |
| | Complementary cycle** | 20.6 | 12.3 | 16.0 | 11.2 | 11.2 | 11.2 | 14.5 | 11.2 | 11.2 | 11.2 | 11.2 | 11.2 |
| | Total | 50.2 | 66.9 | 70.9 | 74.0 | 62.0 | 62.6 | 66.6 | 50.1 | 56.0 | 56.6 | 49.1 | 49.5 |

* See Table 6B, page 82, for identification of alternatives.

** Second Model: net costs

## D. Summary of costs and general conclusions

When adding the costs of the first secondary cycle and those of the complementary cycle under the twelve alternatives described in Table 6B, and under the second model of complementary education,the differences observed earlier are reduced since an offsetting mechanism is at work: if the first secondary cycle tightens its rate of access, the complementary cycle must accomodate more students.

Costs are summarized in Table 21. The total projected cost for the year 1990-91 varies from a minimum of 50 billion CFA F to a maximum of 74 billion -- a difference of 50%. The "best value" alternatives are: (i) alternative (1), owing to its greatly reduced rate of access to sixième (30%), (ii) alternative (8), due to the use of primary school teachers with some media support, and (iii) alternatives (11) and (12), as a result of their reliance on new educational settings that also employ very few highly qualified personnel (community and distance education). Alternative (4) is the most expensive, since it combines a high rate of access with too loose a control of promotions and repetitions in the first cycle (diagram 1).

From the perspective of cost reduction, it will undoubtedly be difficult to accept alternative (1), since it is definitely selective with regard to access to secondary education. Alternatives (8), (11), and (12) are even less expensive and much less selective, but rely largely on new technologies or more modern educational philosophies. The are "liberal-reformist" in nature, and might meet with substantial resistance on this account.

beyond 4 times their present level. Yet, all the alternatives studied exceed this coefficient. It is thus among the least expensive that the final selection must be operated in any case.

The most reasonable policy is undoubtedly Alternative (10), since its cost does not much exceed the minimum cost yielded by Alternative (11), while on the one hand it allows a relatively wide access to the first cycle of secondary education, and on the other hand its innovative content is limited to the most obvious needs (community education in isolated small towns and villages, and marginal media support less costly than Alternatives (5) and (6), next in order of cost, but it produces a better geographical distribution of enrollments.

The other options, which are all more expensive, must almost certainly be discarded because of their cost. There is ample reason to bear that the growth of the educational system will become an intolerable strain on the Ivorian economy, risking disruption of its basic equilibria.

As Eicher and Orivel have already shown in their report on the cost of primary education,*the present development plans of the educational system multiply on the average by a factor of 6 the real resources allotted to education. Such an investment is hard to justify since, as of now, the Ivory Coast already exhibits one of the world's highest appropriation rates for education both as a percentage of the national budget (40%) and as a percentage of the GNP (7 to 8%).

Under no circumstances can one recommend alternatives that assume a multiplication of real GNP by a factor greater than 3 between now and 1990, and the allocation of more than 10% of the GNP to education. This means that expenses must not ne allowed to rise

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* Eicher and Orive, op. cit.

# APPENDIX A

## Tables

**Table A1**: **Estimates (to 1975) of annual first-time enrollment in CP1, CM2 and sixième**

| Year | Enter CP1 | | | Enter CM2 | | | Enter Sixième | | |
|---|---|---|---|---|---|---|---|---|---|
| | Tradi. | TV | Total | Tradi. | TV | Total | Tradi. | TV | Total |
| 1962 | 70,731 | | 70,731 | | | | | | |
| 1963 | 68,163 | | 68,163 | | | | | | |
| 1964 | 70,005 | | 70,005 | | | | | | |
| 1965 | 67,146 | | 67,146 | | | | | | |
| 1966 | 69,571 | | 69,571 | | | | | | |
| 1967 | 72,412 | | 72,412 | | | | | | |
| 1968 | 71,047 | | 71,047 | 33,017 | | 33,017 | | | |
| 1969 | 77,389 | | 77,389 | 36,997 | | 36,997 | | | |
| 1970 | 82,133 | | 82,133 | 40,827 | | 40,827 | | | |
| 1971 | 67,565 | 21,000 | 88,565 | 43,937 | | 43,937 | 20,016 | | 20,016 |
| 1972 | 56,322 | 35,500 | 91,822 | 49,208 | | 49,208 | 21,080 | | 21,080 |
| 1973 | 53,640 | 45,000 | 98,640 | 54,112 | | 54,112 | 21,667 | | 21,667 |
| 1974 | 51,808 | 52,239 | 104,047 | 60,740 | | 60,740 | 23,809 | | 23,809 |
| 1975 | 46,591 | 69,157 | 115,748 | 70,493 | | 70,493 | 26,097 | | 26,097 |

Sources and Computation:

1) Estimates 1962-1975: Reported total enrollment in grade less estimated number of repeaters from previous year.

Source of total enrollment data and repetition percentages: Service Autonome des Etudes Générales de Planification et des Statistiques: Statistiques de l'Enseignement 1973-74. For 1974 and 1975: Service Autonome & DOGE: PROJEDOR, Version 04.

## Table A2:
## Projection of annual first-time enrollment in CP1 and CM2

| | Enter CP1 | | | Enter CM2 | | |
|---|---|---|---|---|---|---|
| Year | Tradi. | TV | Total | Total | Public | Private |
| 1976 | 43,781 | 87,465 | 131,246 | 78,000 | 62,900 | 15,100 |
| 1977 | 40,605 | 101,657 | 142,262 | 83,000 | 67,000 | 16,000 |
| 1978 | 35,325 | 117,572 | 152,897 | 89,000 | 72,700 | 16,300 |
| 1979 | 35,780 | 128,739 | 164,519 | 101,000 | 81,800 | 19,200 |
| 1980 | 36,236 | 141,746 | 177,982 | 107,000 | 89,000 | 18,000 |
| 1981 | 36,820 | 154,904 | 191,807 | 127,000 | 106,700 | 20,300 |
| 1982 | 37,513 | 167,638 | 205,151 | 141,000 | 120,400 | 20,600 |
| 1983 | 38,210 | 185,405 | 224,115 | 150,000 | 130,800 | 19,200 |
| 1984 | 38,016 | 196,349 | 234,365 | 159,000 | 140,600 | 18,100 |
| 1985 | 39,664 | 212,980 | 252,644 | 169,000 | 151,500 | 17,500 |
| 1986 | | | | 182,000 | 164,800 | 17,800 |
| 1987 | | | | 193,000 | 176,100 | 16,900 |
| 1988 | | | | 209,000 | 192,400 | 16,600 |
| 1989 | | | | 219,000 | 202,700 | 16,300 |
| 1990 | | | | 234,000 | 218,000 | 16,000 |

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Sources and Computations:

Projections based on PROJEDOR, Version 08:

a) First enrollments in CP1: As reported in Table 2 of Service Autonome: Projection d'Effectifs, de Classes et de Maîtres pour L'Enseignement Primaire (1975/76 à 1985/86).

b) First enrollment in CM2:

1976 to 1985. Total derived from Table 3, above document; annual repetition calculated through application of implicit CM2 repetition rates (going from 47% in 1976 to 41% in 1985), and subtracted from total CM2 enrollment. Total rounded to nearest thousand. Distribution between public and private sectors based on relative CM1 enrollment of the two sectors in previous year.

1986-1990. Total in year t calculated as a ratio of weighted CP1 entries in year t-5 and t-6: $r(2/3\ E_{t-5} + 1/3\ E_{t-6})$. The ratio r was reduced from .97 in 1985 to .95 in 1990. Total rounded to nearest thousand. New CM2 enrollments in private sector assumed to decline linearly to 16,000 in 1990. New CM2 enrollments in public sector obtained as residual.

## Table A3

Student flow patterns under alternative options respecting (a) the rate of access to sixième, (b) the control of repetitions (in preparation for sixième entrance examinations), and (c) the model of complementary education.

Cohort of 100 pupils entering the CM2 in year t

### Subtable (1)

Rate of access: 30%
Control of repetitions: loose (80%; 50%)
Required rate of admission: K = 18%

| | | | Comp. cycle 1st model | | | Comp. cycle |
|---|---|---|---|---|---|---|
| Year | CM2 | $6^e$ | CC1 | CC2 | CC3 | 2nd model |
| t | 100 | | | | | |
| t+1 | 66* | 18 | 14 | | | 80 |
| t+2 | | 12 | 43 | 11 | | 54 |
| t+3 | | | | 34 | 9 | 43 |
| t+4 | | | | | 20 | |

### Subtable (2)

Rate of access: 30%
Control of repetitions: tight (50%; 50%)
Required rate of admission: K = 22%

| | | | Comp. cycle 1st model | | | Comp. cycle |
|---|---|---|---|---|---|---|
| Year | CM2 | $6^e$ | CC1 | CC2 | CC3 | 2nd model |
| t | 100 | | | | | |
| t+1 | 39* | 27 | 35 | | | 74 |
| t+2 | | 8 | 25 | 78 | | 53 |
| t+3 | | | | 20 | 72 | 42 |
| t+4 | | | | | 16 | |

*Zero under second model of complementary cycle.

## Table A3 - continued

### Subtable (3)

Rate of access: 44%

Control of repetitions: loose (80%; 50%)

Required rate of admission: K = 24%

| | | | Comp. cycle 1st model | | | Comp. Cycle |
|---|---|---|---|---|---|---|
| Year | CM2 | $6^e$ | CC1 | CC2 | CC3 | 2nd model |
| t | 100 | | | | | |
| t+1 | 61* | 24 | 14 | | | 75 |
| t+2 | 23* | 15 | 18 | 11 | | 52 |
| t+3 | | 5 | 13 | 14 | 9 | 36 |
| t+4 | | | | 10 | 12 | |
| t+5 | | | | | 8 | |

### Subtable (4)

Rate of access: 44%

Control of repetitions: tight (50%; 50%)

Required rate of admission: K = 30%

| | | | Comp. cycle 1st model | | | Comp. Cycle |
|---|---|---|---|---|---|---|
| Year | CM2 | $6^e$ | CC1 | CC2 | CC3 | 2nd model |
| t | 100 | | | | | |
| t+1 | 35* | 30 | 32 | | | 67 |
| t+2 | 12* | 11 | 10 | 26 | | 48 |
| t+3 | | 3 | 6 | 8 | 20 | 34 |
| t+4 | | | | 5 | 6 | |
| t+5 | | | | | 4 | |

*Zero under second model of complementary cycle.

## Table A3 - continued

### Subtable (5)

Rate of access: 50%
Control of repetitions: loose (80%; 50%)
Required rate of admission: K = 28%

| | | | Comp. cycle 1st model | | | Comp. cycle |
|---|---|---|---|---|---|---|
| Year | CM2 | $6^e$ | CC1 | CC2 | CC3 | 2nd model |
| t | 100 | | | | | |
| t+1 | 58* | 28 | 13 | | | 71 |
| t+2 | 21* | 16 | 17 | 10 | | 48 |
| t+3 | | 6 | 10 | 14 | 8 | 32 |
| t+4 | | | | 8 | 11 | |
| t+5 | | | | | 6 | |

### Subtable (6)

Rate of access: 50%
Control of repetitions: tight (50%; 50%)
Required rate of admission: K = 35%

| | | | Comp. cycle 1st model | | | Comp. cycle |
|---|---|---|---|---|---|---|
| Year | CM2 | $6^e$ | CC1 | CC2 | CC3 | 2nd model |
| t | 100 | | | | | |
| t+1 | 32* | 35 | 30 | | | 62 |
| t+2 | 11* | 11 | 8 | 24 | | 43 |
| t+3 | | 4 | 5 | 6 | 19 | 30 |
| t+4 | | | | 4 | 5 | |
| t+5 | | | | | 3 | |

*Zero under second model of complementary cycle.

**Table A4:** Projection of student flows from the first year of CM2 (in thousands)

**Subtable (1):** Rate of access: 30%

Control of repetitions*: loose

Required rate of admission: K = 18%

| | | First Model of Complementary Cycle | | | | | Second Model of Complementary Cycle | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Enter in | Enrolled in Comp. Cycle | | Repeat the CM2 Class | | | Enrolled in Comp. Cycle | | Repeat the CM2 Class | | |
| ear | Sixième | Unadj. | Adjus. | Public | Private | Total | Unadj. | Adjust. | Public | Private | Total |
| 976 | 30.0 | | | 46.1 | 10.5 | 56.6 | | | 46.1 | 10.5 | 56.6 |
| 977 | 32.3 | (10.9) | (2.2) | 52.5 | 11.2 | 63.7 | (49.3) | (40.6) | 14.1 | 11.2 | 25.3 |
| 978 | 34.4 | 34.3 | 10.3 | 56.1 | 13.4 | 69.5 | 90.2 | 66.3 | 0.0 | 13.4 | 13.4 |
| 979 | 34.2 | 70.0 | 23.0 | 57.8 | 13.2 | 71.0 | 127.4 | 85.6 | 0.0 | 13.2 | 13.2 |
| 980 | 35.1 | 99.5 | 49.8 | 61.0 | 14.3 | 75.3 | 143.2 | 102.1 | 0.0 | 14.3 | 14.3 |
| 981 | 35.1 | 124.1 | 74.5 | 62.6 | 14.1 | 76.7 | 160.6 | 121.4 | 0.0 | 14.1 | 14.1 |
| 982 | 35.7 | 145.3 | 101.7 | 70.4 | 13.4 | 83.8 | 188.4 | 153.0 | 0.0 | 13.4 | 13.4 |
| 983 | 40.6 | 185.4 | 132.3 | 79.5 | 13.6 | 93.1 | 213.8 | 186.9 | 0.0 | 13.6 | 13.6 |
| 984 | 43.9 | 184.4 | 166.0 | 86.3 | 12.7 | 99.0 | 238.0 | 222.8 | 0.0 | 12.7 | 12.7 |
| 985 | 46.6 | 199.7 | 199.7 | 92.8 | 12.1 | 104.9 | 256.7 | 256.7 | 0.0 | 12.1 | 12.1 |
| 986 | 49.5 | 214.7 | 214.7 | 99.9 | 11.6 | 111.5 | 274.0 | 274.0 | 0.0 | 11.6 | 11.6 |
| 987 | 52.9 | 228.3 | 228.3 | 108.7 | 11.4 | 120.1 | 293.9 | 293.9 | 0.0 | 11.4 | 11.4 |
| 988 | 56.7 | 243.5 | 243.5 | 116.2 | 11.2 | 127.4 | 314.2 | 314.2 | 0.0 | 11.2 | 11.2 |
| 989 | 60.7 | 259.2 | 259.2 | 127.0 | 11.0 | 138.0 | 338.7 | 338.7 | 0.0 | 11.0 | 11.0 |
| 990 | 64.5 | 277.6 | 277.6 | 133.8 | 10.8 | 144.6 | 360.3 | 360.3 | 0.0 | 10.8 | 10.8 |

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* Repetition of preparations for sixième entrance examination

**Table A4:** Projection of student flows from the first year of CM2 (in thousands)

Subtable (2): Rate of access: 30%
Control of repetitions*: tight
Required rate of admission: K = 22%

| Year | Enter in Sixième | First Model of Complementary Cycle |  |  |  |  | Second Model of Complementary Cycle |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | Enrolled in Comp. Cycle |  | Repeat the CM2 Class |  |  | Enrolled in Comp. Cycle |  | Repeat the CM2 Class |  |  |
|  |  | Unadj. | Adjus. | Public | Private | Total | Unadj. | Adjust. | Public | Private | Total |
| 1976 | 30.0 |  |  | 46.1 | 10.5 | 56.6 |  |  | 46.1 | 10.5 | 56.6 |
| 1977 | 33.3 | (10.9) | (2.2) | 52.5 | 11.2 | 63.7 | (49.3) | (40.6) | 14.1 | 11.2 | 25.[illegible] |
| 1978 | 35.2 | [illegible]8.5 | 11.0 | 52.0 | 12.5 | 64.5 | 90.2 | 63.5 | 0.0 | 12.5 | 12.5 |
| 1979 | 36.0 | 78.1 | 31.2 | 48.3 | 11.1 | 59.4 | 126.1 | 79.8 | 0.0 | 11.1 | 11.1 |
| 1980 | 37.2 | 113.2 | 56.6 | 45.6 | 10.6 | 56.2 | 141.1 | 93.3 | 0.0 | 10.6 | 10.6 |
| 1981 | 36.3 | 142.1 | 85.3 | 39.6 | 8.2 | 47.8 | 158.2 | 110.8 | 0.0 | 8.2 | 8.2 |
| 1982 | 38.5 | 164.7 | 115.3 | 41.6 | 7.9 | 49.5 | 184.2 | 141.4 | 0.0 | 7.9 | 7.9 |
| 1983 | 41.2 | 184.2 | 147.4 | 47.0 | 8.0 | 55.0 | 208.5 | 176.2 | 0.0 | 8.0 | 8.0 |
| 1984 | 44.3 | 201.0 | 180.9 | 51.0 | 7.5 | 58.5 | 231.5 | 213.4 | 0.0 | 7.5 | 7.5 |
| 1985 | 47.0 | 215.4 | 215.4 | 54.8 | 7.2 | 62.0 | 249.2 | 249.2 | 0.0 | 7.2 | 7.2 |
| 1986 | 49.9 | 229.8 | 229.8 | 59.1 | 6.8 | 65.9 | 265.6 | 265.6 | 0.0 | 6.8 | 6.8 |
| 1987 | 53.6 | 244.7 | 244.7 | 64.3 | 6.7 | 71.0 | 284.4 | 284.4 | 0.0 | 6.7 | 6.7 |
| 1988 | 56.9 | 261.1 | 261.1 | 68.6 | 6.6 | 75.2 | 303.7 | 303.7 | 0.0 | 6.6 | 6.6 |
| 1989 | 61.5 | 279.6 | 279.6 | 75.0 | 6.5 | 81.5 | 326.8 | 326.8 | 0.0 | 6.5 | 6.5 |
| 1990 | 64.9 | 298.3 | 298.3 | 79.0 | 6.4 | 85.4 | 34[illegible].5 | 347.5 | 0.0 | 6.4 | 6.4 |

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* Repetition of preparations for sixième entrance examination

**Table A4:** Projection of student flows from the first year of CM2 (in thousands)

**Subtable (3):** Race of access: 44%

Control of repetitions*: loose

Required rate of admission: K = 24%

| | | First Model of Complementary Cycle | | | | | Second Model of Complementary Cycle | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Enrolled in Comp. Cycle | | Repeat the CM2 Class | | | Enrolled in Comp. Cycle | | Repeat the CM2 Class | | |
| ear | Enter in Sixième | Unadj. | Adjust. | Public | Private | Total | Unadj. | Adjust. | Public | Private | Total |
| 976 | 30.0 | | | 46.1 | 10.5 | 56.6 | | | 46.1 | 10.5 | 56.6 |
| 977 | 32.3 | (10.9) | (2.2) | 52.5 | 11.2 | 63.7 | (49.3) | (40.6) | 14.1 | 11.2 | 25.3 |
| 978 | 35.2 | 34.3 | 10.3 | 55.3 | 13.3 | 68.6 | 85.4 | 65.5 | 0.0 | 13.3 | 13.3 |
| 979 | 37.8 | 65.0 | 26.0 | 59.8 | 13.6 | 73.4 | 124.5 | 85.7 | 0.0 | 13.6 | 13.6 |
| 980 | 41.8 | 87.3 | 43.6 | 66.7 | 15.4 | 82.1 | 136.5 | 101.6 | 0.0 | 15.4 | 15.4 |
| 981 | 45.4 | 101.5 | 60.9 | 73.1 | 15.4 | 88.5 | 149.3 | 118.8 | 0.0 | 15.4 | 15.4 |
| 982 | 51.7 | 112.2 | 78.5 | 85.0 | 16.5 | 102.1 | 170.7 | 145.2 | 0.0 | 16.5 | 16.5 |
| 983 | 58.3 | 125.5 | 100.4 | 97.9 | 17.3 | 115.2 | 193.0 | 174.0 | 0.0 | 17.3 | 17.3 |
| 984 | 63.6 | 140.3 | 126.3 | 107.5 | 16.4 | 123.9 | 215.1 | 204.3 | 0.0 | 16.4 | 16.4 |
| 985 | 67.8 | 154.1 | 154.1 | 115.9 | 15.6 | 131.5 | 232.5 | 232.5 | 0.0 | 15.6 | 15.6 |
| 986 | 72.1 | 166.2 | 166.2 | 124.8 | 14.9 | 139.7 | 248.6 | 248.6 | 0.0 | 14.9 | 14.9 |
| 987 | 77.1 | 177.3 | 177.3 | 135.4 | 14.5 | 149.9 | 267.1 | 267.1 | 0.0 | 14.5 | 14.5 |
| 988 | 82.1 | 188.9 | 188.9 | 145.4 | 14.3 | 159.7 | 285.8 | 285.8 | 0.0 | 14.3 | 14.3 |
| 989 | 88.1 | 202.0 | 202.0 | 157.9 | 14.0 | 171.9 | 308.7 | 308.7 | 0.0 | 14.0 | 14.0 |
| 990 | 96.5 | 215.7 | 215.7 | 167.8 | 13.7 | 181.5 | 328.8 | 328.8 | 0.0 | 13.7 | 13.7 |

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* Repetition of preparations for sixième entrance examination

## Table A4: Projection of student flows from the first year of CM2 (in thousands)

Subtable (4): **Rate of access:** 44%

**Control of repetitions*:** tight

Required rate of admissions: K = 30%

| | | First Model of Complementary Cycle | | | | | Second Model of Complementary Cycle | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Enter in | Enrolled in Comp. Cycle | | Repeat the CM2 Class | | | Enrolled in Comp. Cycle | | Repeat the CM2 Class | | |
| Year | Sixième | Unadj. | Adjust. | Public | Private | Total | Unadj. | Adjust. | Public | Private | Total |
| 1976 | 30.0 | | | 46.1 | 10.5 | 56.6 | | | 46.1 | 10.5 | 56.6 |
| 1977 | 32.3 | (10.9) | (2.2) | 52.5 | 11.2 | 63.7 | (49.3) | (40.6) | 14.1 | 11.2 | 25.3 |
| 1978 | 36.1 | 37.6 | 11.3 | 51.4 | 12.3 | 63.7 | 88.8 | 62.6 | 0.0 | 12.3 | 12.3 |
| 1979 | 39.5 | 74.0 | 29.6 | 48.9 | 11.2 | 60.1 | 122.4 | 78.3 | 0.0 | 11.2 | 11.2 |
| 1980 | 44.2 | 103.4 | 51.7 | 47.4 | 11.0 | 58.4 | 133.9 | 90.6 | 0.0 | 11.0 | 11.0 |
| 1981 | 47.8 | 123.1 | 73.9 | 43.5 | 9.2 | 52.7 | 144.0 | 103.8 | 0.0 | 9.2 | 9.2 |
| 1982 | 52.9 | 135.5 | 94.9 | 48.1 | 9.2 | 57.3 | 162.7 | 128.3 | 0.0 | 9.2 | 9.2 |
| 1983 | 59.5 | 147.0 | 117.6 | 55.0 | 9.6 | 64.6 | 182.3 | 156.8 | 0.0 | 9.6 | 9.6 |
| 1984 | 64.3 | 159.1 | 143.2 | 60.2 | 9.2 | 69.4 | 202.2 | 188.0 | 0.0 | 9.2 | 9.2 |
| 1985 | 68.4 | 171.3 | 171.3 | 65.0 | 8.2 | 73.7 | 217.7 | 217.7 | 0.0 | 8.7 | 8.7 |
| 1986 | 72.7 | 183.1 | 183.1 | 69.9 | 8.3 | 78.2 | 232.2 | 232.2 | 0.0 | 8.3 | 8.3 |
| 1987 | 78.0 | 195.5 | 195.5 | 75.9 | 8.1 | 84.0 | 249.0 | 249.0 | 0.0 | 8.1 | 8.1 |
| 1988 | 83.0 | 208.4 | 208.4 | 81.4 | 8.0 | 89.4 | 266.2 | 266.2 | 0.0 | 8.0 | 8.0 |
| 1989 | 89.5 | 223.3 | 223.3 | 88.4 | 7.8 | 96.2 | 286.8 | 286.8 | 0.0 | 7.8 | 7.8 |
| 1990 | 94.5 | 237.9 | 237.9 | 94.1 | 7.7 | 101.8 | 305.0 | 305.0 | 0.0 | 7.7 | 7.7 |

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* Repetition of preparations for sixième entrance examination

**Table A4: Projection of student flows from the first year of CM2 (in thousands)**

Subtable (5): Rate of access: 50%
Control of repetitions*: loose
Required rate of admission: K = 28%

| | | First Model of Complementary Cycle | | | | | Second Model of Complementary Cycle | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Enter in | Enrolled in Comp. Cycle | | Repeat the CM2 Class | | | Enrolled in Comp. Cycle | | Repeat the CM2 Class | | |
| Year | Sixième | Unadj. | Adjust. | Public | Private | Total | Unadj. | Adjust. | Public | Private | Total |
| 1976 | 30.0 | | | 46.1 | 10.5 | 56.6 | | | 46.1 | 10.5 | 56.6 |
| 1977 | 32.3 | (10.9) | (2.2) | 52.5 | 11.2 | 63.7 | (49.3) | (40.6) | 14.1 | 11.2 | 25.3 |
| 1978 | 36.1 | 34.3 | 10.3 | 54.7 | 13.1 | 67.8 | 88.8 | 64.9 | 0.0 | 13.1 | 13.1 |
| 1979 | 39.5 | 64.1 | 29.6 | 58.4 | 13.3 | 71.7 | 122.1 | 83.9 | 0.0 | 13.3 | 13.3 |
| 1980 | 44.9 | 84.8 | 42.4 | 64.4 | 14.8 | 79.2 | 131.5 | 98.0 | 0.0 | 14.8 | 14.8 |
| 1981 | 50.7 | 96.6 | 58.0 | 68.9 | 14.4 | 83.3 | 140.5 | 111.9 | 0.0 | 14.4 | 14.4 |
| 1982 | 58.8 | 104.3 | 73.0 | 80.6 | 15.6 | 96.2 | 159.3 | 135.7 | 0.0 | 15.6 | 15.6 |
| 1983 | 66.2 | 114.0 | 91.2 | 93.3 | 15.2 | 108.5 | 180.1 | 162.7 | 0.0 | 15.2 | 15.2 |
| 1984 | 72.2 | 126.0 | 113.4 | 101.2 | 15.4 | 116.6 | 199.4 | 189.6 | 0.0 | 15.4 | 15.4 |
| 1985 | 77.0 | 137.7 | 137.7 | 109.0 | 14.7 | 123.7 | 215.3 | 215.3 | 0.0 | 14.7 | 14.7 |
| 1986 | 81.7 | 148.2 | 148.2 | 117.3 | 14.1 | 131.4 | 230.2 | 230.2 | 0.0 | 14.1 | 14.1 |
| 1987 | 87.4 | 158.1 | 158.1 | 127.3 | 13.7 | 141.0 | 247.5 | 247.5 | 0.0 | 13.7 | 13.7 |
| 1988 | 93.3 | 168.5 | 168.5 | 136.8 | 13.4 | 150.2 | 265.2 | 265.2 | 0.0 | 13.4 | 13.4 |
| 1989 | 100.3 | 181.1 | 181.1 | 148.7 | 13.1 | 161.8 | 286.1 | 286.1 | 0.0 | 13.1 | 13.1 |
| 1990 | 106.4 | 193.3 | 193.3 | 157.9 | 13.0 | 170.9 | 304.6 | 304.6 | 0.0 | 13.0 | 13.0 |

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* Repetition of preparations for sixième entrance examination

## Table A4: Projection of student flows from the first year of CM2 (in thousands)

Subtable (6): Rate of access: 50%
Control of repetitions*: tight
Required rate of admission: K = 35%

| Year | Enter in Sixième | First Model of Complementary Cycle | | | | | First Model of Complementary Cycle | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Enrolled in Comp. Cycle | | Repeat the CM2 Class | | | Enrolled in Comp. Cycle | | Repeat the CM2 Class | | |
| | | Unadj. | Adjust. | Public | Private | Total | Unadj. | Adjust. | Public | Private | Total |
| 1976 | 30.0 | | | 46.1 | 11.2 | 56.6 | | | 46.1 | 10.5 | 56.6 |
| 1977 | 32.3 | (10.9) | (2.2) | 52.5 | 11.2 | 63.7 | (49.3) | (40.6) | 14.1 | 11.2 | 25.3 |
| 1978 | 37.9 | 37.6 | 11.3 | 50.7 | 12.1 | 62.8 | 88.2 | 61.9 | 0.0 | 12.1 | 12.1 |
| 1979 | 41.3 | 73.1 | 29.9 | 47.5 | 10.9 | 58.4 | 120.1 | 76.5 | 0.0 | 10.9 | 10.9 |
| 1980 | 48.1 | 101.8 | 50.9 | 45.0 | 10.5 | 55.5 | 129.7 | 87.3 | 0.0 | 10.5 | 10.5 |
| 1981 | 54.1 | 117.0 | 70.2 | 39.8 | 8.5 | 48.3 | 134.6 | 96.7 | 0.0 | 8.5 | 8.5 |
| 1982 | 60.3 | 125.5 | 87.9 | 43.9 | 8.5 | 52.4 | 149.5 | 117.8 | 0.0 | 8.5 | 8.5 |
| 1983 | 67.7 | 133.7 | 107.0 | 50.3 | 8.8 | 59.1 | 165.3 | 142.3 | 0.0 | 8.8 | 8.8 |
| 1984 | 73.1 | 143.4 | 129.1 | 55.1 | 8.4 | 63.5 | 183.3 | 170.5 | 0.0 | 8.4 | 8.4 |
| 1985 | 77.8 | 154.1 | 154.1 | 59.4 | 8.0 | 67.4 | 197.5 | 197.5 | 0.0 | 8.0 | 8.0 |
| 1986 | 82.7 | 164.4 | 164.4 | 64.0 | 7.6 | 71.6 | 210.6 | 210.6 | 0.0 | 7.6 | 7.6 |
| 1987 | 88.7 | 175.6 | 176.5 | 69.5 | 7.4 | 76.9 | 225.9 | 225.9 | 0.0 | 7.4 | 7.4 |
| 1988 | 94.3 | 187.2 | 187.2 | 74.4 | 7.3 | 81.7 | 241.3 | 241.3 | 0.0 | 7.3 | 7.3 |
| 1989 | 101.8 | 200.7 | 200.7 | 81.0 | 7.2 | 88.2 | 260.0 | 260.0 | 0.0 | 7.2 | 7.2 |
| 1990 | 107.4 | 213.6 | 213.6 | 86.1 | 7.0 | 93.1 | 276.6 | 276.6 | 0.0 | 7.0 | 7.0 |

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* Repetition of preparations for sixième entrance examination

## Table A5: Enrollment Projections - First Cycle of Secondary Education

**Projection I**

**Rate of access:** 30%

**Control of repetitions*:** tight

**Flow parameters:** Diagram 2

| Year | Admission to 6e | Enrollment in 6e | 5e | 4e | 3e | TOTAL |
|---|---|---|---|---|---|---|
| 1975-76 | - | 29773 | 23917 | 20473 | 15891 | 90054 |
| 1976-77 | - | 31849 | 26745 | 21964 | 17077 | 97636 |
| 1977-78 | 33300 | 35964 | 30257 | 25675 | 21305 | 113201 |
| 1978-79 | 35200 | 38016 | 34166 | 29047 | 24905 | 126134 |
| 1979-80 | 36000 | 38880 | 36115 | 32799 | 28176 | 135970 |
| 1980-81 | 37200 | 40176 | 36936 | 34670 | 31815 | 143597 |
| 1981-82 | 36300 | 39204 | 38167 | 35459 | 33630 | 146460 |
| 1982-83 | 38500 | 41580 | 37244 | 36640 | 34395 | 149859 |
| 1983-84 | 41200 | 44496 | 39501 | 35754 | 35541 | 155292 |
| 1984-85 | 44300 | 47844 | 42271 | 37921 | 34681 | 162717 |
| 1985-86 | 47000 | 50760 | 45452 | 40580 | 36783 | 173575 |
| 1986-87 | 49900 | 53892 | 48222 | 43644 | 39363 | 185121 |
| 1987-88 | 53600 | 57888 | 51197 | 46293 | 42335 | 197713 |
| 1987-88 | 53600 | 57888 | 51197 | 46293 | 42335 | 197713 |
| 1988-89 | 56900 | 61452 | 54994 | 49149 | 44904 | 210499 |
| 1989-90 | 61500 | 66420 | 58379 | 52794 | 47675 | 225268 |
| 1190-91 | 64900 | 70092 | 63099 | 56044 | 51210 | 240445 |

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* Repetitions of preparation for sixième entrance examination

## Table A5: Enrollment Projections - First Cycle of Secondary Education

**Projection II**

**Rate of access:** 44%

**Control of repetitions*:** loose

**Flow parameters:** Diagram 1

| Year | Admission to 6e | Enrollment in 6e | 5e | 4e | 3e | Total |
|---|---|---|---|---|---|---|
| 1975-76 | - | 29773 | 23917 | 20473 | 15891 | 90054 |
| 1976-77 | - | 31849 | 26745 | 21964 | 17077 | 97363 |
| 1977-78 | 32300 | 36208 | 32677 | 27280 | 21876 | 118041 |
| 1978-79 | 35200 | 39459 | 37149 | 33331 | 27171 | 137110 |
| 1979-80 | 37800 | 42374 | 40485 | 37891 | 33198 | 153948 |
| 1980-81 | 41800 | 46858 | 43476 | 41295 | 37739 | 169368 |
| 1981-82 | 45400 | 50893 | 48076 | 44346 | 41130 | 184445 |
| 1982-83 | 51700 | 58956 | 52216 | 49038 | 44169 | 203379 |
| 1983-84 | 58300 | 65354 | 59463 | 53260 | 48842 | 226919 |
| 1984-85 | 63600 | 71296 | 67053 | 60652 | 53047 | 252048 |
| 1985-86 | 67800 | 76004 | 73150 | 68394 | 60409 | 277957 |
| 1986-87 | 72100 | 80824 | 77980 | 74613 | 68120 | 301537 |
| 1987-88 | 77100 | 86429 | 82925 | 89540 | 74315 | 323209 |
| 1988-89 | 82100 | 92034 | 88676 | 84584 | 79222 | 344516 |
| 1989-90 | 88100 | 98760 | 94427 | 90450 | 84246 | 367883 |
| 1990-91 | 96500 | 108177 | 101328 | 96316 | 90088 | 395909 |

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* Repetitions of preparation for sixième entrance examination

## Table A5: Enrollment Projections - First Cycle of Secondary Education

**Projection III**

**Rate of access:** 44%
**Control of repetitions*:** tight
**Flow parameters:** Diagram 1

| Year | Admission[1] to 6e | Enrollment in 6e | 5e | 4e | 3e | Total |
|---|---|---|---|---|---|---|
| 1975-76 | - | 29773 | 23917 | 20473 | 15891 | 90054 |
| 1976-77 | - | 31849 | 26745 | 21964 | 17077 | 97636 |
| 1977-78 | 32300 | 36208 | 32677 | 27280 | 21876 | 118041 |
| 1978-79 | 36100 | 40468 | 37149 | 33331 | 27171 | 138119 |
| 1979-80 | 39500 | 44280 | 41520 | 37892 | 33198 | 156890 |
| 1980-81 | 44200 | 49548 | 45431 | 42350 | 37740 | 175069 |
| 1981-82 | 47800 | 53584 | 50836 | 46340 | 42181 | 192941 |
| 1982-83 | 52900 | 59301 | 53977 | 51853 | 46155 | 212286 |
| 1983-84 | 59500 | 66700 | 60843 | 56077 | 51646 | 235266 |
| 1984-85 | 64300 | 72080 | 68434 | 62060 | 55853 | 258427 |
| 1985-86 | 68400 | 76676 | 73954 | 69803 | 61812 | 282245 |
| 1986-87 | 72700 | 81497 | 78670 | 75433 | 69524 | 305124 |
| 1987-88 | 78000 | 87438 | 83616 | 80243 | 75131 | 326428 |
| 1988-89 | 83000 | 93043 | 89711 | 85288 | 79922 | 347964 |
| 1989-90 | 89500 | 100330 | 95462 | 91505 | 84947 | 372244 |
| 1990-91 | 94500 | 105934 | 102939 | 97371 | 91139 | 397383 |

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[1] Chaque fois que 1000 étudiants venant du CM2 entrent en 6e, il se trouve avec eux, conformément à ce qui est prévu au diagramme 1, 117 redoublants et 4 élèves venant de l'étranger ou d'ećoles antérieurement non reconnues (flux additionnel B). En conséquence, pour connaître les effectifs totaux en 6e, on a multiplié les entrées par le coefficient 1, 117+0,004=1,121. On a procédé de la même facon pour les classes de 5e,4e et 3e. Ainsi, par exemple, en 5e on voit arriver 87,7% des élèves de 6e plus 11% de redoublants, plus 0,3% du flux additionnel B, moins 0, 1% d'abandons du flux B, plus 0,3% des 5e de ces mêmes écoles, soit un coefficient de 1,026.

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* Repetitions of preparation for sixième entrance examination

**Table A5: Enrollment Projections - First Cycle of Secondary Education**

**Projection IV**

**Rate of access:** 50%

Control of repetitions*: loose

**Flow parameters:** Diagram 1

| Year | Admissions to 6e | Enrollment in 6e | 5e | 4e | 3e | Total |
|---|---|---|---|---|---|---|
| | - | 29773 | 23917 | 20473 | 15891 | 90054 |
| 1976-77 | - | 31849 | 26745 | 21964 | 17077 | 97636 |
| 1977-78 | 32300 | 36208 | 32677 | 27280 | 21876 | 118041 |
| 1978-79 | 36100 | 40468 | 37149 | 33331 | 27171 | 138119 |
| 1979-80 | 39500 | 44280 | 41520 | 37892 | 33198 | 156890 |
| 1980-81 | 44900 | 50332 | 45431 | 42350 | 37740 | 175854 |
| 1981-82 | 50700 | 59077 | 51642 | 46340 | 42181 | 199240 |
| 1982-83 | 58800 | 65915 | 60613 | 52675 | 46155 | 225358 |
| 1983-84 | 66200 | 74210 | 67629 | 61825 | 52464 | 256128 |
| 1984-85 | 72200 | 80936 | 76139 | 68982 | 61578 | 287635 |
| 1985-86 | 77000 | 86317 | 83040 | 77662 | 68706 | 315725 |
| 1986-87 | 81700 | 91586 | 88561 | 84701 | 77351 | 342199 |
| 1987-88 | 87400 | 97975 | 93967 | 90322 | 84362 | 366626 |
| 1988-89 | 93300 | 104589 | 100522 | 95846 | 89961 | 390918 |
| 1989-90 | 100300 | 112436 | 107308 | 102532 | 95463 | 417739 |
| 1990-91 | 106400 | 119274 | 115359 | 109454 | 102122 | 446389 |

* Repetitions of preparation for sixième entrance examination

Table A5: Enrollment Projections -First Cycle of Secondary Education

Projection V

Rate of access: 50%

Control of repetitions*: loose

Flow parameters: Diagram 3

| Year | Admissions to 6e | Enrollment in 6e | 5e | 4e | 3e | Total |
|---|---|---|---|---|---|---|
|  | - | - | 23917 | 20473 | 15891 | 90054 |
| 1976-77 | - | 31849 | 26745 | 21964 | 17077 | 97636 |
| 1977-78 | 32300 | 35530 | 29301 | 23803 | 19328 | 107962 |
| 1978-79 | 36100 | 39710 | 32688 | 26078 | 20947 | 119423 |
| 1979-80 | 39500 | 43450 | 36533 | 29092 | 22949 | 132024 |
| 1980-81 | 44900 | 49390 | 39974 | 32514 | 25601 | 147479 |
| 1981-82 | 50700 | 55770 | 45439 | 35577 | 28612 | 165398 |
| 1982-83 | 58800 | 64680 | 51308 | 40441 | 31308 | 187737 |
| 1983-84 | 66200 | 72820 | 59506 | 45664 | 35588 | 213578 |
| 1984-85 | 72200 | 79420 | 66994 | 52960 | 40184 | 239558 |
| 1985-86 | 77000 | 84700 | 73066 | 59625 | 46605 | 263996 |
| 1986-87 | 81700 | 89870 | 77924 | 65029 | 52470 | 285293 |
| 1987-88 | 87400 | 96140 | 82680 | 69352 | 57226 | 305398 |
| 1988-89 | 93300 | 102630 | 88449 | 73585 | 61030 | 325694 |
| 1989-90 | 100300 | 110330 | 94420 | 78720 | 64755 | 348225 |
| 1990-91 | 106400 | 117040 | 101504 | 84034 | 69274 | 371852 |

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* Repetitions of preparation for sixième entrance examination

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## Table A5: Enrollment Projections - First Cycle of Secondary Education

### Projection VI

Rate of access: 50%
Control of repetitions*: tight
Flow parameters: Diagram 3

| Year | Admissions to 6e | Enrollment in 6e | 5e | 4e | 3e | Total |
|---|---|---|---|---|---|---|
| 1975-76 | - | 29773 | 23917 | 20473 | 15891 | 90054 |
| 1976-77 | - | 31849 | 26745 | 21964 | 17077 | 97636 |
| 1977-78 | 32300 | 35530 | 29301 | 23803 | 19328 | 107962 |
| 1978-79 | 37900 | 41690 | 32688 | 26078 | 20947 | 121403 |
| 1979-80 | 41300 | 45430 | 38355 | 29092 | 22949 | 135826 |
| 1980-81 | 48100 | 52910 | 41796 | 34136 | 25601 | 154443 |
| 1981-82 | 54100 | 59510 | 48677 | 37198 | 30040 | 175425 |
| 1982-83 | 60300 | 66330 | 54749 | 43323 | 32734 | 197136 |
| 1983-84 | 67700 | 74470 | 61024 | 48727 | 38124 | 222345 |
| 1984-85 | 73100 | 80410 | 68512 | 54311 | 42880 | 246113 |
| 1985-86 | 77800 | 85580 | 73977 | 60976 | 47794 | 268327 |
| 1986-87 | 82700 | 90970 | 78734 | 65840 | 53659 | 289203 |
| 1987-88 | 88700 | 97570 | 83692 | 70073 | 57939 | 309274 |
| 1988-89 | 94300 | 103730 | 89764 | 74486 | 61664 | 329644 |
| 1989-90 | 101800 | 111980 | 95432 | 79890 | 65548 | 352850 |
| 1990-91 | 107400 | 118140 | 103022 | 84934 | 70303 | 376399 |

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* Repetitions of preparation for sixième entrance examination

## Table A6: Cost of Complementary Cycle, Second Model

### I: Cost of Transit Students

| Year | Option Vector (I) | | | Option Vector (II) | | |
|---|---|---|---|---|---|---|
| | Part A | Part B | Total | Part A | Part B | Total * |
| 1977-78 | 1534 | 1020 | 2854 | 1534 | 1268 | 2802 |
| 1978-79 | 2171 | - | 2111 | 2309 | 337 | 2646 |
| 1979-80 | 2049 | - | 2049 | 2537 | 518 | 3055 |
| 1980-81 | 1987 | - | 1981 | 2907 | 480 | 3387 |
| 1981-82 | 1776 | - | 1776 | 3278 | 937 | 4215 |
| 1982-83 | 1858 | - | 1858 | 3823 | 923 | 4746 |
| 1983-84 | 2153 | - | 2153 | 4484 | 720 | 5204 |
| 1984-85 | 2395 | 210 | 2605 | 5048 | 630 | 5678 |
| 1985-86 | 2642 | 323 | 3965 | 5589 | 668 | 6257 |
| 1986-87 | 2923 | 390 | 3313 | 6173 | 795 | 6968 |
| 1987-88 | 3262 | 322 | 3584 | 6869 | 750 | 7619 |
| 1988-89 | 3558 | 480 | 4038 | 7540 | 937 | 8477 |
| 1989-90 | 3981 | 300 | 4281 | 8907 | 743 | 9650 |
| 1990-91 | 4271 | 300 | 4571 | 9071 | 743 | 9814 |

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*Part A = Costs proportional to enrollment
Part B = Costs related to enrollment growth

## Table A6: Section I (continued)

| Year | Option Vector (III) | | | Option Vectors (IV & V) | | | Option Vector (VI) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Part A | Part B | Total | Part A | Part B | Total | Part A | Part B | Total * |
| 1977-78 | 1534 | 975 | 2509 | 1534 | 1223 | 2757 | 1534 | 922 | 2456 |
| 1978-79 | 2146 | - | 2146 | 2284 | 277 | 2561 | 2117 | - | 2117 |
| 1979-80 | 2075 | - | 2075 | 2478 | 450 | 2928 | 2015 | - | 2015 |
| 1980-81 | 2066 | - | 2066 | 2807 | 338 | 3145 | 1961 | - | 1901 |
| 1981-82 | 1951 | - | 1951 | 3089 | 877 | 3966 | 1785 | - | 1785 |
| 1982-83 | 2148 | 270 | 2418 | 3600 | 953 | 4553 | 1961 | - | 1961 |
| 1983-84 | 2519 | 390 | 2909 | 4273 | 592 | 4865 | 2304 | 330 | 2634 |
| 1984-85 | 2827 | 360 | 3187 | 4752 | 583 | 5337 | 2587 | 323 | 2910 |
| 1985-86 | 3134 | 368 | 3502 | 5256 | 623 | 5879 | 2864 | 345 | 3209 |
| 1986-87 | 3457 | 450 | 3907 | 5802 | 750 | 6552 | 3165 | 412 | 3577 |
| 1987-88 | 3850 | 412 | 4262 | 6458 | 712 | 7170 | 3526 | 300 | 3894 |
| 1988-89 | 4221 | 525 | 4746 | 7094 | 893 | 7987 | 3858 | 495 | 4353 |
| 1989-90 | 4692 | 478 | 5120 | 7993 | 690 | 8683 | 4299 | 382 | 4681 |
| 1990-91 | 5087 | 428 | 5515 | 8536 | 690 | 9226 | 4655 | 382 | 5037 |

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[*] Part A = Costs proportional to enrollment
Part B = Costs related to enrollment growth

## Table A6: Cost of Complementary Cycle, Second Model

### II: Cost of Terminal Students

| Year | Option Vector (I) | | | Option Vector (II) | | |
|---|---|---|---|---|---|---|
| | Part A | Part B | Total | Part A | Part B | Total |
| 1977-78 | 104 | 2116 | 2280 | 104 | 1877 | 1981 |
| 1978-79 | 569 | 3680 | 4249 | 505 | 2889 | 3394 |
| 1979-80 | 1581 | 2981 | 4562 | 1300 | 1656 | 2956 |
| 1980-81 | 2448 | 4324 | 6772 | 1791 | 1987 | 3778 |
| 1981-82 | 3744 | 5262 | 9006 | 2403 | 2558 | 4961 |
| 1982-83 | 5231 | 5703 | 10934 | 3124 | 3296 | 6470 |
| 1983-84 | 6919 | 6619 | 13538 | 4075 | 4209 | 8284 |
| 1984-85 | 8885 | 6301 | 15186 | 5296 | 3873 | 9169 |
| 1985-86 | 10881 | 2825 | 13706 | 6526 | 1600 | 8126 |
| 1986-87 | 11814 | 3231 | 15045 | 7083 | 1809 | 8892 |
| 1987-88 | 12871 | 3803 | 16674 | 7702 | 2282 | 9984 |
| 1988-89 | 14014 | 4430 | 18444 | 8369 | 2842 | 11211 |
| 1989-90 | 15317 | 4302 | 19619 | 9173 | 2612 | 11785 |
| 1990-91 | 16596 | 3980 | 20576 | 9951 | 2336 | 12287 |

*Part A = Costs proportional to enrollment
Part B = Costs related to enrollment growth

## Table A6: Section II (continued)

| Year | Option Vector (III) | | | Option Vectors (IV & V) | | | Option Vector (VI) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Part A | Part B | Total | Part A | Part B | Total | Part A | Part B | Total * |
| 1977-78 | 104 | 2061 | 2165 | 104 | 1877 | 1981 | 104 | 2061 | 2165 |
| 1978-79 | 554 | 3349 | 3903 | 505 | 2815 | 3320 | 554 | 3275 | 3829 |
| 1979-80 | 1475 | 2539 | 4014 | 1280 | 1490 | 2770 | 1455 | 2447 | 3902 |
| 1980-81 | 2217 | 3146 | 5363 | 1725 | 1730 | 3455 | 2171 | 2686 | 4857 |
| 1981-82 | 3171 | 3662 | 6833 | 2226 | 2276 | 4452 | 2992 | 3128 | 6120 |
| 1981-83 | 4203 | 4260 | 8463 | 2888 | 2891 | 5779 | 3873 | 3616 | 7489 |
| 1983-84 | 5451 | 5248 | 10699 | 3716 | 3886 | 7602 | 4927 | 4760 | 9687 |
| 1984-85 | 6992 | 4934 | 11926 | 4836 | 3500 | 8336 | 6314 | 4516 | 10830 |
| 1985-86 | 8547 | 2202 | 10749 | 5950 | 1461 | 7411 | 7729 | 1936 | 9665 |
| 1986-87 | 9285 | 2495 | 11780 | 6459 | 1651 | 8110 | 8387 | 2237 | 10624 |
| 1987-88 | 10123 | 2989 | 13112 | 7029 | 2134 | 9163 | 9146 | 2679 | 11825 |
| 1988-89 | 11016 | 3629 | 14645 | 7654 | 2531 | 10185 | 9770 | 3277 | 13047 |
| 1989-90 | 12069 | 3287 | 15356 | 8358 | 2374 | 10732 | 10889 | 3071 | 13960 |
| 1990-91 | 13036 | 2981 | 16017 | 9068 | 2124 | 11192 | 11787 | 2742 | 14529 |

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*Part A = Costs proportional to enrollment

Part B = Costs related to enrollment growth

# APPENDIX B

## Outline of Selected Technological Alternatives

## I. COMMUNITY EDUCATION:

### 1. International Experience: The Telesecundaria System of Mexico

Briefly put, the Telesecundaria System (TS) in Mexico uses televised instruction to supplement trained primary school teachers in charge of classes at the first-cycle level of secondary education -- each teacher covering all subject matters in his one class. (For a cost effectiveness study of the project, cf. Mayo, McAnany and Klees [1975]). The system was created in 1968 to help Mexico's Secretariat of Public Education provide secondary education to primary graduates who had no schools in their rural areas (usually in towns of less than 5,000 inhabitants) or who had dropped out of a regular secondary school in urban areas and wanted a second chance. The curriculum, testing and crediting systems are the same as in traditional schools (students graduating from TS have the same right as other students to enter further schooling streams). Each community provides a classroom and TV receiver, while the Ministry of Education provides books, TV programs and the single primary school teacher per classroom (now with local financing).

Cost savings accrue in the areas of teaching (less well-trained teachers at lower salary), administration (smaller rural schools demanding less administrative overhead), and facilities (TV classes are held in donated or rented rooms in houses or public buildings). One major benefit is that secondary education can reach students in rural areas where the government would not have built regular secondary schools because of the small number of students (class size in traditional schools is double that of TS). Apparently, students of TS schools, even those from poorer backgrounds and rural areas, learn about as well as in traditional schools; graduates of TS schools seem also to have been successful in continuing their schooling in institutions outside their small towns; parents seem more involved in the education of their children when they have more responsibility for providing classroom facilities and seeing to the operation of the school.

On the negative side, however, it should be noted that televised programs in the TS system have been of poor quality and generally have done little to improve upon the traditional curriculum or promote innovative learning.

## 2. Application to Secondary Education in the Ivory Coast

The chances for a successful extension of the Mexican experience to the Ivory Coast depends on the similarities and differences observable between educational developments in each country.

One clear similarity between the two countries is a dramatic increase in the number of primary graduates and in the pressure to continue into the first cycle of secondary. Also, there is in each case a strong concentration of secondary schools in urban areas, which means that rural primary graduates will have to migrate to continue schooling. There is a communication technology infrastructure available in both countries to produce and broadcast instructional television programs to rural and urban areas. Parents in the Ivory Coast, like their counterparts in

Mexico, seem to be eager for their children to enjoy further educational opportunity and may be willing to invest toward that end.

There are also differences. The Ivory Coast is still in the process of rapidly expanding its primary education so that it may not have a surplus of primary teachers to take up duties in a TS system. The traditions against a TS system in the Ivory Coast might be stronger than those that existed (and they were formidable) in Mexico. Such traditions, for example, would probably stand against giving regular credit for work performed in a setting that, to many, seems more appropriate for collective entertainment than for serious learning. To the extent, however, that community education is extended only to localities from which access to regular secondary schools would be either impossible or prohibitively expensive, the opposition is likely to be short-lived.

### 3. Application to the Proposed "Complementary Cycle"

Some of the problems identified above might be less serious if community education is developed within the "complementary cycle" proposed in the text as an alternative to secondary education. For example, one would expect less opposition from the more traditional school interest groups among teachers, the educational bureaucracy and parents if the new system is reserved for students who do not gain access to sixieme. The complementary classes would normally be located near primary school facilities (or even use primary school facilities through double scheduling) and perhaps employ some primary school teachers (again on a double or extended shift for extra pay).

The main problem, however, is whether community education as described is adaptable to the curriculum objectives of the complementary cycle. As was mentioned earlier, the Mexican experience indicates that students can learn general secondary subjects quite well under the proposed approach. What there is little evidence about is the effectiveness of ITV or radio in vocational or technical subjects. Mexico had a technical course in its Telesecundaria, but it was the least popular with students and the one which, in the opinion of project managers, seemed the least effective. Another adverse factor is the low level of motivation toward work in "academic" subjects which "terminal" students of the complementary cycle are likely to exhibit, and the strong supervision which repeaters of the preparation to the sixieme examination will tend to require. On balance, therefore, it appears that the new cycle will be better served by a dominant input of teachers and monitors, the television media providing only some marginal support.

## II. EXTENSION EDUCATION (DISTANCE LEARNING)*

### 1. International Experience: Distance Learning in Adult Education

The distance learning alternative, besides serving young individuals forced by circumstances to join the labor force immediately upon completing their primary studies, would also be relevant to the growing number of adults (18 and over) who have completed their primary education and/or dropped out of secondary school and who wish to complete the first cycle of secondary education. It is also a possible model to be used in the nonformal education of adults not seeking a school degree. For this report, however, attention will be given only to the formal education use of distance learning.

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*This approach is sometimes called open learning. Distance learning stresses the fact that students learn away from school, on their own, usually individually in their homes and require instruction by mail or media, and send homework in by mail. Open learning puts stress on the democratization of education access achieved by the system. Many students can enroll and gain credits by working full time and studying at night.

There are a number of experiences with distance learning that are beginning to be evaluated (cf. MacKenzie, Postgate and Scupham). They generally have involved adults at all levels of the school system, but Australia has had over forty years experience with radio-correspondence schools for scattered primary students. There are a growing number of countries that have begun to use distance learning approaches for secondary level students. Brazil, Colombia, Korea, Mexico, and Japan have all used some form of media (TV and/or radio) in their systems, usually along with some kind of correspondence. Japan has had the longest experience with distance learning for secondary students and the results have been encouraging.

What are the components of a secondary-level distance learning system and what are the implications of each for the effectiveness of the project?

Components: The distance learning approach usually includes the following components.

1. Carefully constructed printed texts (either on each course separately or a combined textbook).

2. Worksheets or homework assignments (to be completed and mailed or taken to a (local) corrector who reviews and marks the student's work and returns it within a relatively brief time [2-3 weeks]).
3. Radio and/or TV programs to reinforce or teach certain aspects of the curriculum.
4. Attendance at brief face-to-face sessions with teachers (sometimes one day a month at a local tutorial center or one week of summer school sessions or both).

There are variations around this structure, depending on local needs and constraints, but this is the general pattern. Sometimes, for instance, science kits are sent to students to be used and returned, or are available at local tutorial centers. Students take courses for credit, take exams and, if successful, receive recognized secondary degrees.

Effectiveness: The cost-effectiveness experience in this area can be summarized as follows:

1. The number of users must be large enough to justify the large fixed costs of the program. This means that the demand for education must outstrip opportunity, so that people who have not completed a certain level of education are motivated enough to study, often in addition to full time work.
2. The distance learning system must not simply seek to enroll a large number of students, but must also provide the necessary support to allow a significant

number to graduate. Dropout rates are expected to be much higher in such a system than in ordinary secondary schools, but there is a point beyond which distance learning would lose any claim to efficiency and serve no purpose other than to give people the illusion of having more opportunity than they do.

3. The organization of the system is more important than in regular face-to-face schooling situations. Printed materials need to be more carefully developed and pretested because no teacher is available to answer student questions. Slow feedback does not allow a student to review previous work and strengthen his weak points (both reliable mail or other delivery and a staff of well-organized and dedicated correctors are essential).

4. A different approach to cost-effectiveness needs to be taken in distance learning. As MacKenzie et al. (1975) point out, students in this kind of system are quite different from regular school attendees. They may, for example, be forced by family constraints to drop out of studies for a time, and it is difficult to put values on courses completed as opposed to degrees earned. Making comparisons with regular school alternatives may be impossible, since many students in distance learning programs simply could not study in other circumstances.

## 2. Application to Post-Primary (including secondary) Education in the Ivory Coast

There are several circumstances that make distance learning an attractive alternative for the Ivory Coast: (a) All indications point to the growth of a substantial demand for post-primary education which no country may have the resources to satisfy through standard school education. (Japan began a secondary distance learning program in 1953 because demand for entry far outstripped places and still does so.) (b) The Ivory Coast, with its experience with ITV, has the beginnings of an infrastructure to create both printed and broadcast materials. (c) A large number of potential clients of secondary education are likely to be prevented from attending regular schools because of geographic isolation and/or obligations to work immediately upon completing primary school.

There are, however, a number of circumstances that would mitigate against the adoption of such an alternative: (a) There is a general prejudice of institutional educators against such a "second class" system (although the success of the British Open University has lessened this a little). The Ivory Coast, with strong roots in French classical education, would probably be even more hostile to such an innovation. (b) Delivery and feedback systems that depend on mail might place too great a strain on the postal service. Alternative systems may be costly and/or unreliable. (This is not insurmountable, however, since Nigeria and Kenya have operating distance learning systems.) (c) Organizational/ management personnel may be in short enough supply to place the system beyond present Ivorian capacities. More foreign technical assistance might be necessary, and the Ivorization of education can be further delayed.